In the production of alkalis at Mathieson's Saltville, Virginia plant, it's Bryant Snead's job to pilot samples regularly through this important plant control test—the analysis of gases from the carbonating towers. Like other Mathieson veterans, Snead is steeped in the Mathieson tradition of painstaking, extra-precautionary care that have made Mathieson Chemicals famous for their purity and uniformity.

Today Mathieson Caustic Soda, Soda Ash, and Bicarbonate of Soda are in demand in a wide range of industries. Whether produced at Saltville or at the Mathieson plant at Lake Charles, La., their high purity and uniformity remain a constant factor, justly prized in every industrial field where alkalis are used.

Mathieson Chemicals

THE MATHIESON ALKALI WORKS (INC.)
60 E. 42ND STREET, NEW YORK, N. Y.

SODA ASH . . . CAUSTIC SODA . . . BICARBONATE OF SODA . . . LIQUID CHLORINE . . . BLEACHING POWDER . . . HTH PRODUCTS . . . AMMONIA, ANHYDROUS and AQUA . . . FUSED ALKALI PRODUCTS . . . CCH (INDUSTRIAL HYPOCHLORITE) . . . DRY ICE . . . LIQUID CARBON DIOXIDE . . . ANALYTICAL SODIUM CHLORITE

The Reader Writes:—

A Personnel "Marketplace"

I think CHEMICAL INDUSTRIES is the outstanding chemical magazine from all angles, on the American Market today.

I would like to suggest that you run a column to bring together men of highly specialized training and concerns that need them. It has always been difficult to accomplish, but we all know the condition that exists and you may be able to solve it especially on technical sales service.

Nashville, Tenn. — DR. J. C. CARLIN, *Manager*, Gaither Chemical Works.

Articles on Sales Organizations

I suggest that you publish an article or a series of them, on the formation of sales organizations in the heavy chemical and specialties fields, showing sales organization charts of large and small chemical manufacturing companies.

Philadelphia, Pa. — BEN P. STEELE, *Sales Mgr.*, Pennsylvania Salt Mfg. Co.

The Core of the Argument

I was glad to note that you had the temerity to state editorially that the core of the argument on the licensing of chemists is the question of the ultimate licensing of all chemists by the state. If the politicians are hungry for money to pay for their excesses, then it is only a matter of time when they will tap this potential source of revenue. There are plenty of dangers in this and it would be well to remember them when chemists choose which side of the fence they are going to be on.

Chicago, Ill. — RUDOLPH C. KRASS

Poor Old New England!

I hope that the business men of New England will take to heart the advice that your new series "New Lamps for Old" will likely give them. Poor Old New England has been getting pretty well kicked around, what with tariff pacts, labor pacts, and pacts with Southern Chambers of Commerce.

Springfield, Mass. — ARTHUR C. MCCLOSKY

Support the Barkley Bill

Your editorial of June, 1939, in CHEMICAL INDUSTRIES was very much to the point. The writer is a member of the committee which drew up the Barkley Bill and which committee is fathering its passage through both houses of Congress.

At this particular time the conservation groups are attacking this bill on the ground that it is not sufficiently punitive and they propose various drastic substitutes.

You could render no greater aid to the chemical industry or to the people of America than to vigorously recommend support of the Barkley Bill.

May the writer have the pleasure of submitting this thought for your consideration.

Cincinnati, Ohio — WILLIAM J. REARDON, *Pres.*, Reardon Color and Chemical Works

Enjoys All Of It!

You have a fine magazine and we read and enjoy all of it.

Billings, Montana — K. B. Chemical Co.

Certainly in the Interest of Safety

May we have ten reprints of page 623 of the June issue of CHEMICAL INDUSTRIES on the subject, "Safe Handling of Flammable Solvents in Drums"? Thank you.

Carlstadt, N. J. — J. T. MORRIS, *Supt.*, Franco-American Chemical Works

Who Makes Firstoline?

Up to the present time I have not found out who the firm is that makes the wetting agent called "Firstoline" and thought that you might know.

Houston, Tex. — W. A. GULDEN, *Pres.*, HyLo Company

"Nice" Editorials

Yours is a swell book, the Buyer's Guidebook Number is particularly useful. The editorials are nice to read, but hardly useful.

Brooklyn, N. Y. — WALTER B. KASPAREIT, *Vice-Pres.*, Artstone Rocor Corporation

Still An Other Bouquet!

We are interested in reading the entire magazine and subscribe each year.

Brooklyn, N. Y. — William E. Jourdan & Bro., Inc.

LAST CALL

Every manufacturer and sales agent of raw materials, chemicals and chemical specialties is entitled to listings in our annual BUYER'S GUIDEBOOK NUMBER.

Free Listings

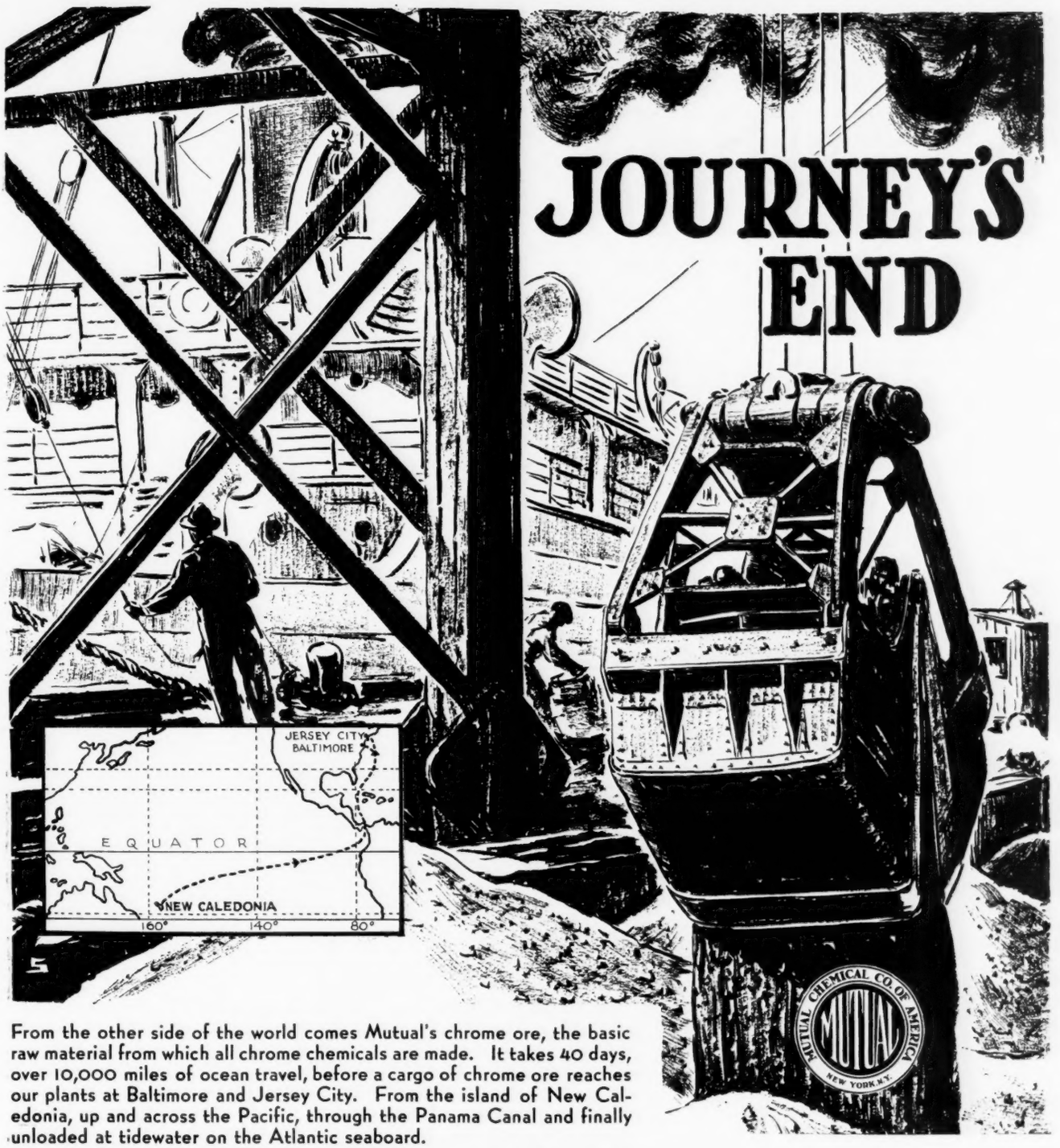
There is no charge for these listings, but on the other hand your products listed in the BUYER'S GUIDEBOOK will supply needed information to buyers of your products. We will distribute 10,000 of these books among your customers and possible customers.

We sent you a questionnaire on which we checked in red the products under which you were listed in our last issue. If you have not already done so, check your questionnaire over carefully, eliminating the products you no longer handle or add new lines.

Mail Today

Mail your questionnaire to us today . . . or if you have misplaced it write or wire us today for another. Press day is drawing near and your questionnaire must be in our hands immediately to assure complete listings of your products in our 1939 BUYER'S GUIDEBOOK NUMBER.

CHEMICAL INDUSTRIES
522 FIFTH AVENUE NEW YORK, N. Y.



From the other side of the world comes Mutual's chrome ore, the basic raw material from which all chrome chemicals are made. It takes 40 days, over 10,000 miles of ocean travel, before a cargo of chrome ore reaches our plants at Baltimore and Jersey City. From the island of New Caledonia, up and across the Pacific, through the Panama Canal and finally unloaded at tidewater on the Atlantic seaboard.

Thus the Mutual Chemical Company of America, owning and operating rich chrome mines and with two modern plants, in this country, controls every step in the manufacture of chromium chemicals. These ore reserves at our mines and plants, together with large stocks of finished products in our plants and warehouses, safely provide for emergencies and offer to Mutual's customers the advantages of a completely unified chromium chemical company.

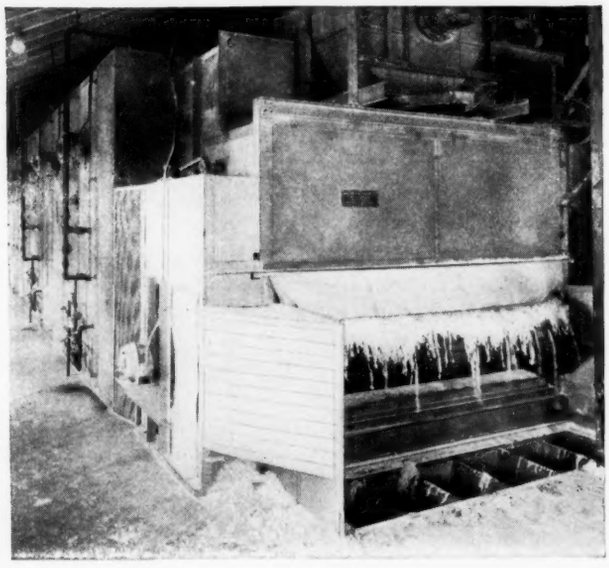
BICHROMATE OF SODA
BICHROMATE OF POTASH
CHROMIC ACID OXALIC ACID

MUTUAL CHEMICAL CO. OF AMERICA
270 MADISON AVENUE, NEW YORK, N. Y.

MUTUAL BICHROMATES

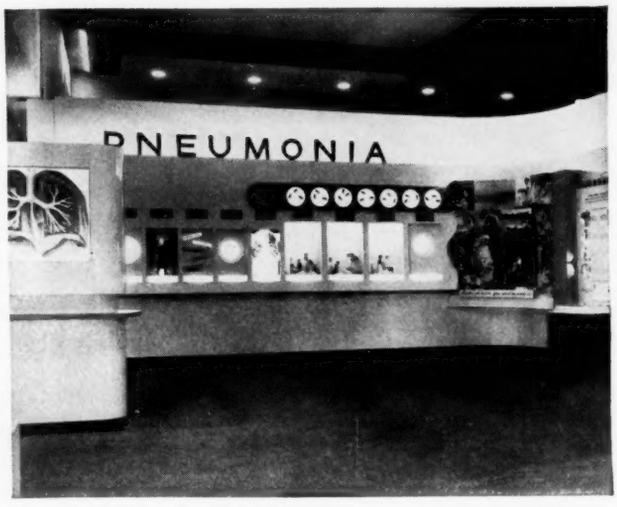
Life

(*Above*) **FOUNTAINS OF FLAME** erupt toward the sky as the nation gleefully touches off rockets, Roman candles, set pieces, in celebration of Independence Day. Explosives Department of American Cyanamid & Chemical Corporation lends a helping hand to the festivities by its manufacture of fireworks powder and fuse powder. Man in the street loses interest in explosives after the one big day—but all year 'round Cyanamid's explosives plants go on turning out industrial explosives for such basic activities as mining, quarrying, and road building. Cyanamid's line includes commercial dynamites, blasting powders, caps and fuses for these important industries.



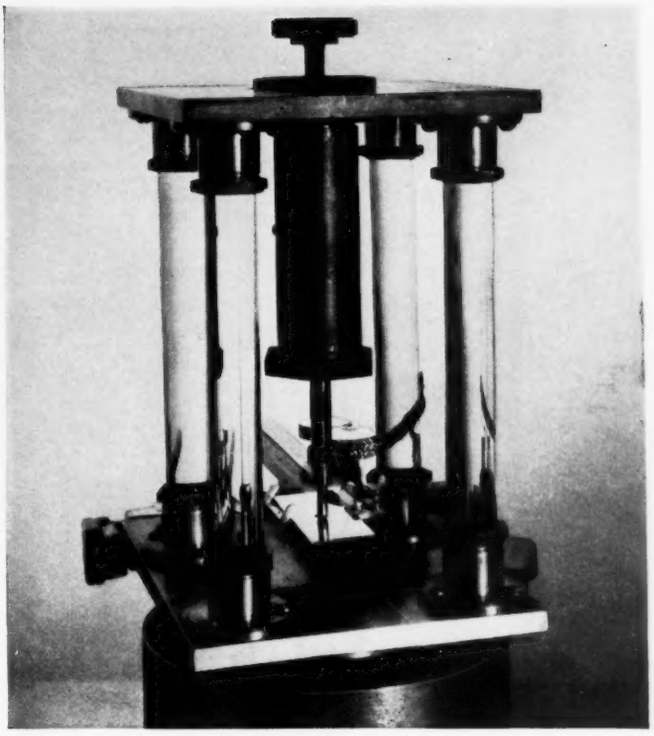
(*Above*) **RIBBONS OF SOAP** stream from drying machines as manufacturers keep up with the growing demand for soap chips. Marked improvements have aroused public interest—and a big contributing factor has been Cyanamid's Tetra Sodium Pyro Phosphate, Anhydrous. A formidable name to anyone who isn't a chemist—but soap manufacturers found it easy to translate into terms of the things their customers want. More and better suds—a soap that is easy on hands and fabrics—faster rinsing—these are just a few of the advantages that the soap industry has been quick to recognize in this new development.

(*Above*) **PROGRESS IN EVERYDAY THINGS** is one of the most striking achievements of chemical research. Especially noteworthy gains have been recorded in the textile industry. View shows the process of drawing for French spinning in the woolen industry. Included among Cyanamid's products is a long line of chemicals for the textile industry. Of special interest to the woolen industry are Cyanamid's compounds for garnetting and stock lubrication, scouring, fulling, dyeing, and carbonizing—and the technical service and cooperation offered by Cyanamid's staff of specialists.



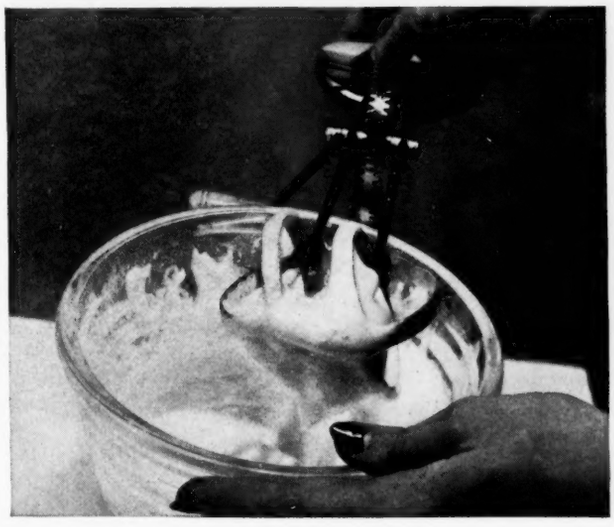
(*Right*) **WAR ON DISEASE** is dramatized at the World's Fair exhibits of Lederle Laboratories, Inc., subsidiary of American Cyanamid Company. Lederle specializes in the manufacture of serums, antitoxins, vaccines. One of its greatest contributions to health has been the development of a complete line of serums for the treatment of pneumococcus pneumonia. Research at Lederle is constantly carried on to aid mankind in his battle against the forces of disease. Sidelight on the Lederle exhibits is their physical construction. Panels are faced with large sheets of laminated Beetle**, the urea formaldehyde resin produced by Beetle Products Division of American Cyanamid Company. Beetle is also made in forms suitable for molding.

ON THE CHEMICAL NEWSFRONT

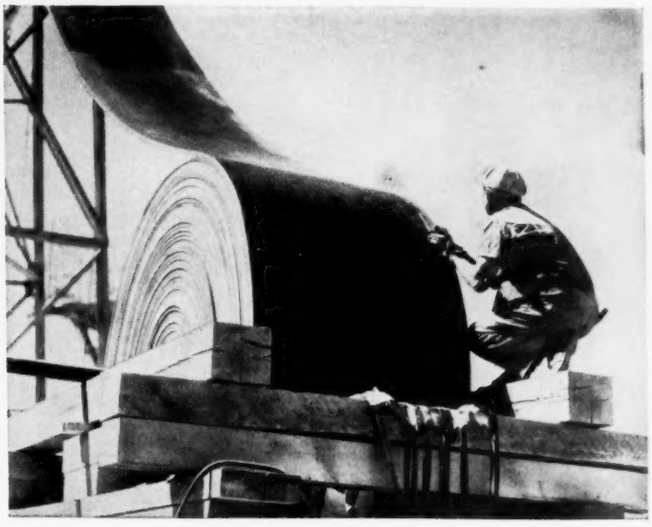


(*Right*) **"MEASURE IT IN MOLECULES"** is the watchword at General Electric, where scientists are studying the properties of films so thin that a dust particle would cause an error of 50 per cent in measuring the thickness. Films are made of such organic materials as barium stearate. Research workers have found that these films—only one-millionth of an inch thick—may have electrical insulating properties comparable to those of the best dielectrics in use today. Illustrated is the mercury drop electrode apparatus used in investigating the characteristics of these ultra-thin films. Area studied is about size of a pin-head.

(*Below*) **A TASTY DISH** whipped up by scientists of the U. S. Department of Agriculture will be particularly relished by the dairy industry, for it promises new outlets for the industry's by-products. Whey, produced—and frequently discarded—in large quantities as a by-product of the cheese industry and casein manufacture, is one of the subjects of the Department's investigations. Shown here is one of the new profitable substances that can be recovered from whey—a soluble protein that can be beaten like egg white (and can be used for many of the same purposes). Other products now reclaimable from whey are milk sugar and a solution rich in vitamin G.



(*Below*) **HITCHING UP GRAND COULEE'S BELT** is a tough assignment, for the belt is two miles long and weighs 80 tons. It carries sand and gravel from the washing and screening plant to stock piles near the dam. Estimated capacity is 30,000 tons a day. Belt is made of rubber and cotton—and both these industries find plenty of use for Cyanamid chemicals. Newest of Cyanamid's contributions to the rubber industry is *AERO AC 50, a delayed-action activator that is practically inert at processing temperatures, a powerful activator at curing temperatures, giving products of high modulus and tensile properties. Pamphlet available on request shows application of AERO AC 50 in various types of compounds.



American Cyanamid & Chemical Corporation

30 ROCKEFELLER PLAZA • NEW YORK, N. Y.

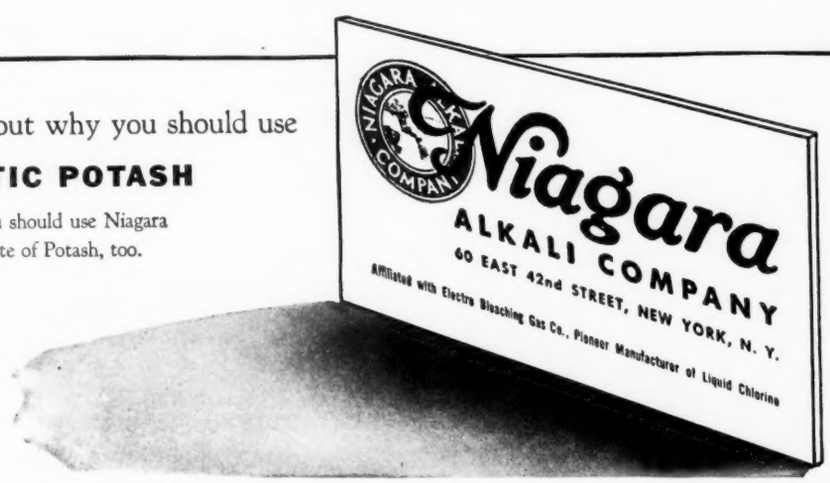
*Registered U. S. Patent Office. **Trade-mark of American Cyanamid Company applied to urea products manufactured by it.

"But Mamma, we just couldn't leave until we'd solved that puzzle in the last issue of THE PIONEER."*

It's no puzzle at all to figure out why you should use

NIAGARA CAUSTIC POTASH

And it's easy to see why you should use Niagara Caustic Soda and Carbonate of Potash, too.


NIAGARA ALKALI COMPANY
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ALKALI COMPANY
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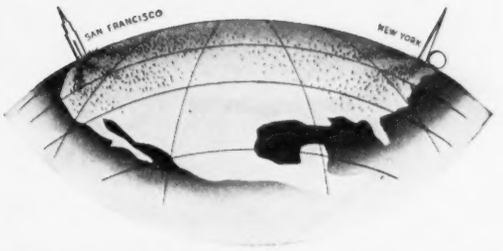
Affiliated with Electro Bleaching Gas Co., Pioneer Manufacturer of Liquid Chlorine

*The house organ of Niagara Alkali Company, which will be sent to you monthly on request.

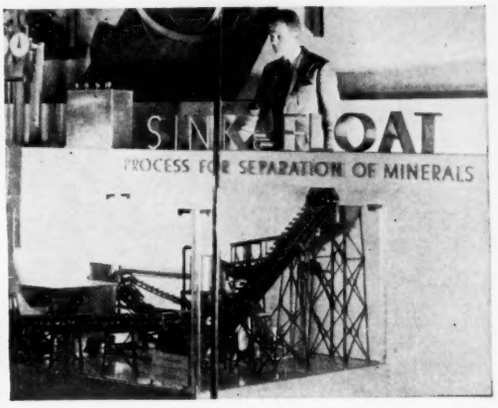
HOW CHEMICAL RESEARCH CONTRIBUTES TO BETTER LIVING FOR AMERICA

Symbolic of the better things that have come from scientific research—a striking mural at du Pont's New York Exhibit—Chemistry's contribution to mankind.

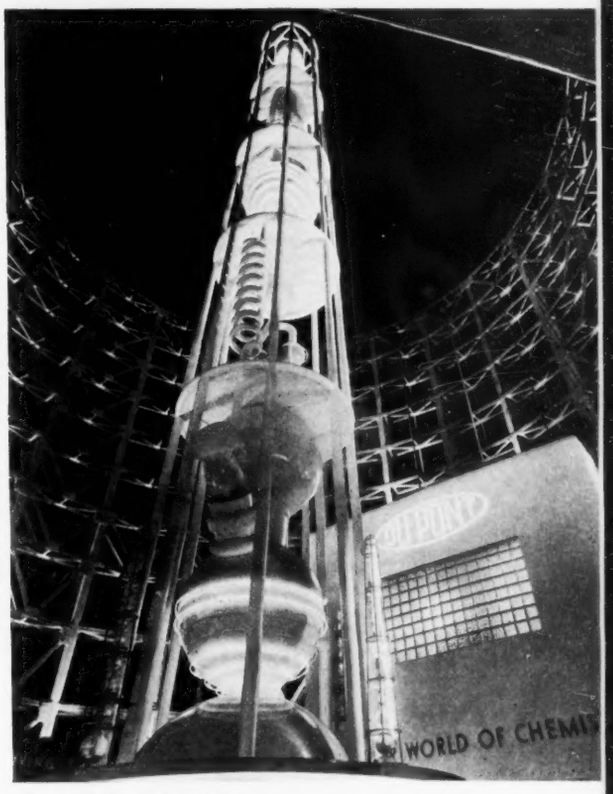


The two great World's Fairs—San Francisco and New York—with their dramatic presentations of the accomplishments of American genius and enterprise are more than educational exhibits. They provide inspiration out of which will come many new things for the world of tomorrow. At each of these fairs, du Pont is showing how modern applied chemistry is daily bringing new comforts, new opportunities for gainful employment, better things for living—tangible evidence that everybody benefits with chemical progress.

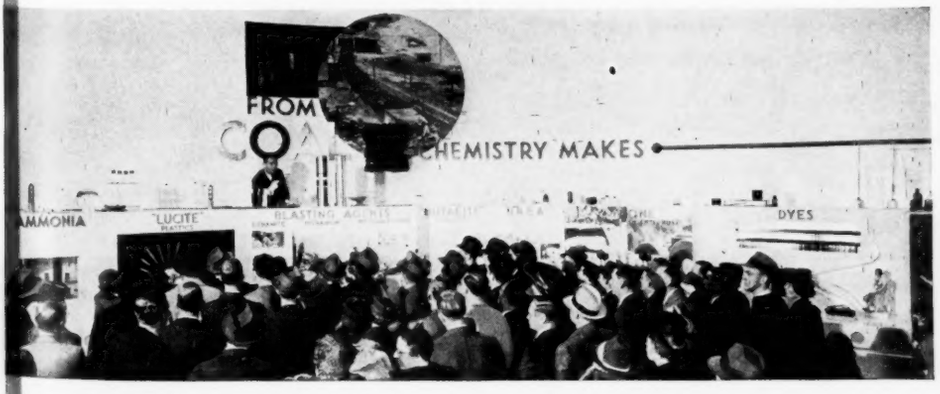
Millions will hear the story of the inner workings . . . will figuratively be taken into the laboratory and into the plant and will see step by step, how from such raw materials as coal, cotton, wood, vegetable oils, ores and salt, chemistry has produced a variety of products once unknown but now considered every day necessities.



It took 34 years of research by chemists and chemical engineers to perfect the "Sink and Float" process for gravity separation of coal and minerals by means of chemical "parting liquids." Still in its infancy, the development marks a long stride forward for the mining industry.



The 107 ft. Chemical Tower at the entrance of the du Pont building, New York World's Fair, symbolizes modern applied chemistry and research.



Improved products and new products—results of the close cooperation between du Pont research and industry—are on display and demonstrated at both Fairs.

AN INVITATION

YOU are cordially invited to visit the du Pont Exhibits. In both you'll find much that is interesting and new. You will see and hear about products which will stimulate your imagination . . . and get ideas which you may be able to apply profitably in your own business.

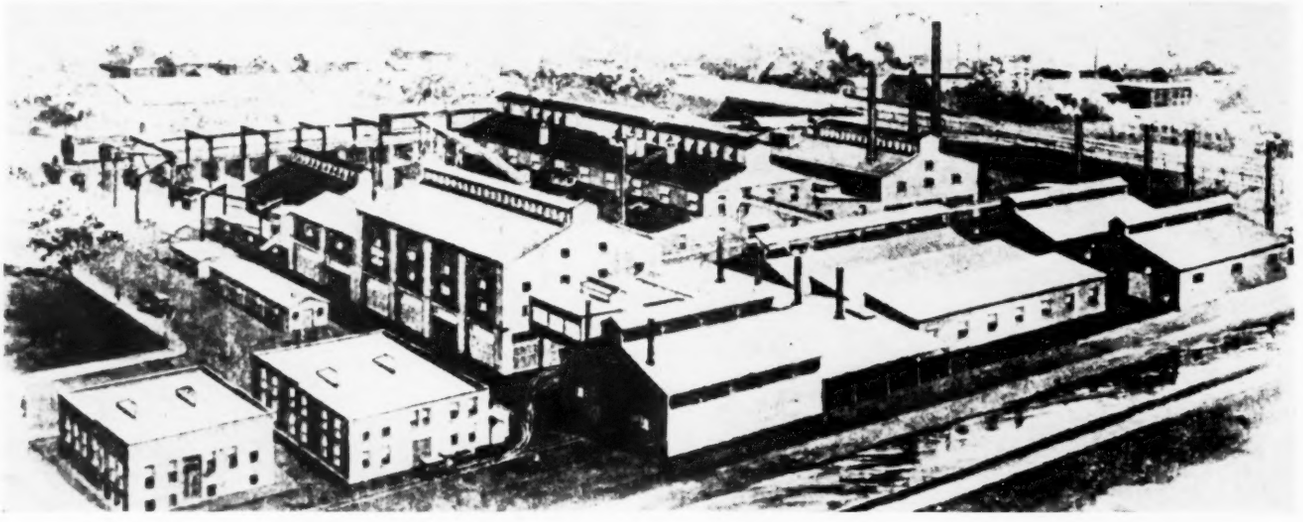
DU PONT

E. I. DU PONT DE NEMOURS & COMPANY, INC.

The R. & H. Chemicals Department, Wilmington, Del.

District Sales Offices: BALTIMORE, BOSTON, CHARLOTTE, CLEVELAND, CHICAGO, KANSAS CITY, NEWARK, NEW YORK, PHILADELPHIA, PITTSBURGH

More than
A QUARTER CENTURY OF SPECIALIZATION



To make one small group of products for more than a quarter of a century is, indeed, the acme of specialization.

But to do that one thing so well that each year finds more and more customers indicating a preference for our products clearly shows that this specialization must prove advantageous to them. We'd like to prove this to you.

Natural BICHROMATES

Natural Products Refining Co., 904 Garfield Ave., Jersey City, N. J.

CHEMICAL INDUSTRIES

The Chemical Business Magazine

Consulting Editorial Board
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Ninety-two to One Odds

THOSE fitting ceremonies by which the Rumford Chemical Works marked their eightieth birthday are doubly significant. They were not only a timely, appropriate remembering of a distinguished chemical past, but they are also a clear-visioned looking forward to a greater chemical future.

We do well, especially in these times, to recall the works of our industrial grandsires. Their vigorous virtues of courage and perseverance, of ingenuity and self-reliance, of hard work and thrift, are a wholesome antidote to today's poisonous "isms." Moreover, it is heartening for us to examine their simple, handmade apparatus. No chemical man worth his salt can do so without being struck by the inspiring thought that eighty years hence our own gigantic, streamlined plants will appear to our successors unbelievably little and crude.

But the Rumford celebration held a more tangible, immediate promise. It furnishes the example of an old, profitable chemical enterprise, not satisfied to rest on its laurels, but with youthful enthusiasm expanding into new fields. It is an example with other meanings, for we see the fruitful results obtained when a trained, experienced, progressive chemical intelligence is placed in command of an established chemical operation.

The opportunity Rumford eagerly embraces is not unique. Thanks to the technical skill of our larger chemical manufacturers and the sharp competition between them, all our standard chemical tools—acids, alkalies, solvents, coal-tar intermediates—can now be bought at favorable prices more apt to go lower than higher. A foundation is readymade for the manufacture of specialty products for the consumer markets. Other companies than Rumford could expand in this manner: A. E. Marshall is not the only competent chemical consultant who might be drafted for an administrative post.

Most significant of all, however, is the chemical exploitation of inorganic materials. Rumford's logical development hooks in naturally with the notable results that have come from work done during recent years by Victor, Monsanto, Warner, A.A.C., and others upon the element phosphorous. Our old inorganic chemical problems should all be re-studied by means of modern research. All our standard heavy chemical operations should be overhauled in the light of modern engineering. Our best chemical brains and most of our chemical resources have been too long concentrated upon the chemistry of carbon. After all, carbon is but one of the ninety-three elements.

Quicksilver Turns Upward

Again quicksilver quotations are rising and the outlook is for still higher prices. Reliable sources report that several nations are continuing to buy heavily for possible war use, while once more the demand in industry has expanded. Announcement that the Italian-Spanish cartel is again officially functioning has added strength to the price structure, despite the fact that it is rather common knowledge that the cartel actually operated all during the Spanish Civil War. Those who have hoped the cartel might reduce prices in order to capture a greater portion of the American market, are likely to be disappointed. It is not reasonable to suppose that the group will sacrifice world prices on some 80,000 flasks in an effort to increase its exports to the United States above the present average of about 15,000 flasks annually, when our total consumption of foreign and domestic metal only amounts to some 30,000 flasks.

Horse-and-Buggy Civil Servants

Appointment of Archie MacLeish as Librarian of Congress is more serious than even the vigorous protests of professional librarians and devoted library users the country over would indicate. To name to a conspicuous technical position one whose sole qualifications are that he is "a gentleman, a poet, and a good New Dealer" is at once another flagrant example of the President's uncanny skill in fitting square keys into round administrative holes and of his devotion to the spoils system of government employment. While these traits do much, first to explain the failure of Mr. Roosevelt's plans when put into action, and second to justify the accusations of his introduction of wardheeler politics into the federal services, nevertheless, to the professional man and the citizen interested in government efficiency, such an appointment is a calamity.

If we are to expand over Federal Government's activities, which is obviously a pet purpose of the President, we need as never before a skilled, disinterested, permanent corps of civil servants. Mr. MacLeish at the post that makes him titular leader of the whole American public library system is a return to the spirit and technique of the good old days when any nice old maid in straitened circumstances who had a taste for reading was considered the ideal head for the Squidville Free Library.

Give and Give Now

While the word "crisis" has lost its poignancy since Munich, no other word quite expresses the desperate condition that the Chemists Advisory Council is now facing. Funds are practically exhausted. If this worthy work is to continue, and very definitely it must continue, then all employed technicians and the chemical companies must not shirk their plain duty to contribute and to do so without delay.

In an industry, such as ours, blessed with an unmatched degree of prosperity, it should not be necessary for Dr. Walter S. Landis, as president of the Council, to stand literally with hat in hand soliciting funds so that this permanent organization formed to render immediate service to unemployed chemists and chemical engineers and to provide a broad and fundamental program of guidance, can continue to function properly. What one of us if personally solicited by Dr. Landis for a contribution would fail to give? Why then hesitate! While money must be immediately forthcoming to tide the Council over the summer period, there should be a concerted effort by all concerned, and that means everybody in the industry, to find the financial means to supply an endowment that would permit the directors to lay out a permanent plan of operation. Your contribution, large or small, should be sent at once to the Chemist Advisory Council, 300 Madison Avenue, New York, N. Y.

"Pre-Chemical" Courses

Much of the support for state licensing of chemists is based on the assumption by the chemists themselves that this will materially aid in maintaining a professional status similar to that enjoyed by doctors and lawyers. This thought immediately invites comparison of the respective academic work required of chemical, medical and law students.

The premedical course is now demanded by recognized schools of medicine and, similarly, most of the accepted law schools are today truly graduate schools. Several colleges and universities are favorably inclined to lengthen their courses leading to chemical and chemical engineering degrees, and indeed, some are reported to be "toying" with the idea of "pre-chemical" and "pre-engineering" degrees.

It would seem that a major overhauling of our chemical courses is desirable. Those who direct our colleges and universities appear to be fully cognizant of such need. It is a good time for all concerned "to say their piece."

Silver as a Raw Material

By Robert H. Leach

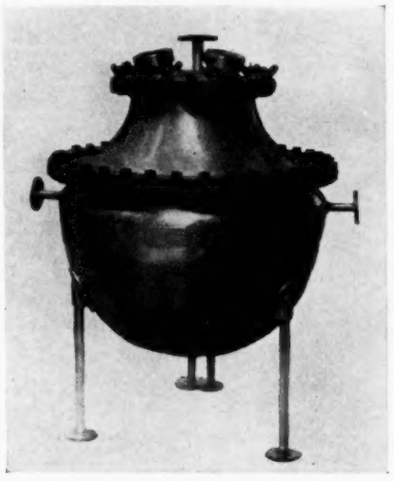
Rolling wide sheets of silver.

Much of the world's history has revolved around the precious metal silver. Although the principal use has been as a monetary metal or a medium of exchange, a number of important chemical and industrial uses of silver and its alloys have been developed down through the ages and particularly in the last few decades. Robert H. Leach, vice-president of Handy & Harman and an international authority on the metal, reviews the history of silver from prehistoric times down to the present, supplies complete data on the physical and chemical properties, and in Part II discusses in detail the industrial applications of silver, and its use in the chemical and allied fields as a raw material and in the fabrication of chemical process equipment.

SILVER, one of the first metals discovered and used for thousands of years, is found in metallic form in many parts of the world. Sometimes the purity of the silver is of a high degree. More often, however, it is associated with copper or gold in the form of alloys that in some cases closely resemble the synthetic alloys that are used today in the arts and industry. The occurrence of silver or its alloys in this native state provided prehistoric man with a malleable and ductile metal that he could form into ornaments and other articles even with the crude implements that he possessed.

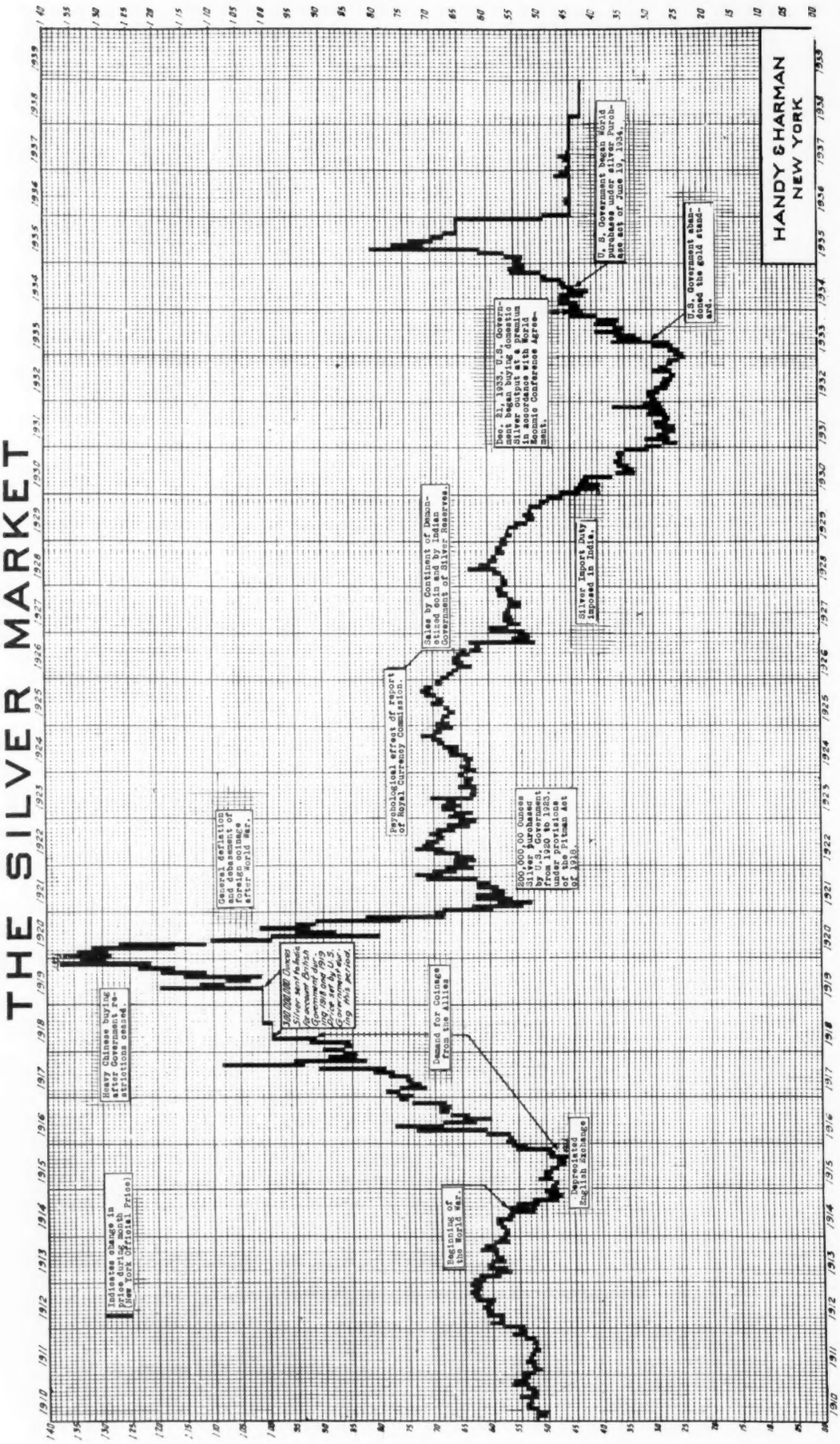
The nobility of the metal and its comparative scarcity have caused it to be used throughout the ages as a measure of wealth and a medium of exchange. It has always been classed as a precious metal and the desire to possess it has been shared by peoples in all parts of the world.

Native silver, which was the first source of supply, accounts for only a small part of the total production. Silver occurs in many ores, usually as a sulfide and is commonly associated with lead, copper and zinc. The silver content of the ore may vary from a few ounces per ton in lead and copper ores to hundreds or even thousands of ounces in those ores where silver is the principal value. Metal workers in ancient times discovered that when lead ores containing silver were smelted the lead collected the silver (also the gold if present) and that molten lead could be oxidized leaving the silver (and gold) untouched. Wet processes for the extraction of the silver from its ores and also amalgamation processes were developed. The large increase in the production of lead, copper and zinc from ores carrying small amounts of silver has increased the supply of this by-product silver to more than 50 per cent. of the total annual production. This development has an important bearing upon the price of silver because it is probable that silver from this source would continue to come on the market long after the price of silver had dropped to a point where only the richest silver ores could be handled at a profit. Modern improved metallurgical processes not only result in a high recovery of the silver and gold but the refined metals are very pure.



Autoclave in a pharmaceutical plant with fine silver inside and with a copper jacket.

The coinage of silver into small pieces with suitable marks to designate their value for monetary purposes has been one of the principal uses in both ancient and modern times; the first coins were crude shapes of varying size and fineness, but through successive stages of development, sovereign states have adopted standard weights and fineness for different coins and control their issue. As fine silver is too soft to prevent excessive loss from abrasion it is customary to add a base metal, usually copper, which hardens the metal and produces an alloy resistant to wear. The fineness of silver coins issued by different countries varies from 420 to 900. Silver coinage in the United States is 900 fine. The British coinage for several hundred years was 925


THE SILVER MARKET
HANDY & HARMAN
NEW YORK
Indicates change in price during month (New York Official Price)
Heavy Chinese buying after Government restrictions ceased.
Beginning of the World War.
Demonetization of English exchange
Demand for Coinage from the Allies
Psychological effect of report of Royal Currency Commission.
Sales by Continent of Demonetized coin and by Indian Governments of Silver Reserves.
200,000,000 Ounces Silver purchased by U.S. Government from 1920 to 1923, under provisions of the Pittman Act of 1918.
Silver Import Duty imposed in India.
Dec. 21, 1933, U.S. Government began buying domestic silver and foreign bullion in accordance with World Economic Conference Agreement.
U. S. Government began World purchase under silver Purchase act of June 19, 1934.
U.S. Government abandoned the gold standard.

fine but was reduced to 500 fine in 1920.

Silver coins have a currency value in the country of their origin which is stamped on the face of the coin, but their intrinsic or bullion value depends upon their weight and fineness.

For many years China and India were the principal consumers of silver. In India, the savings of the poorer classes consist of various pieces of silver and it has been customary for a man to adorn the women in his family with bracelets and silver ornaments and to hoard silver coins. Silver, therefore, has represented the greater part of the wealth of millions of people in India. China was a silver standard country and required large amounts of the metal as a basis for its currency until the silver buying program of the United States caused China to abandon the silver standard and adopt a system of managed currency as a result of which hundreds of millions of ounces of silver have been shipped out of the country.

Silver Piping.

The purity of silver is referred to as the "fineness" of the metal, and a bar that contained 99.95 per cent. silver would be designated as 999.5 parts fine, meaning that 999.5 parts per thousand were silver. In this country the standard silver acceptable for good delivery in bullion trading is 999.0 fine and is referred to as fine silver. In England and the Orient bars 996.0 fine are acceptable for delivery against contracts for purchase.

For convenience in handling large amounts of silver it is cast into bars weighing approximately 1000 troy ounces. The troy ounce is the accepted unit of weight except in those countries where the metric system is standard and the kilogram or gram are used. There are 14.583 troy ounces in an avoirdupois pound and a convenient approximate conversion can be made by dividing the troy ounce weight by 15, for example, 1500 troy ounces equals approximately 100 avoirdupois pounds.

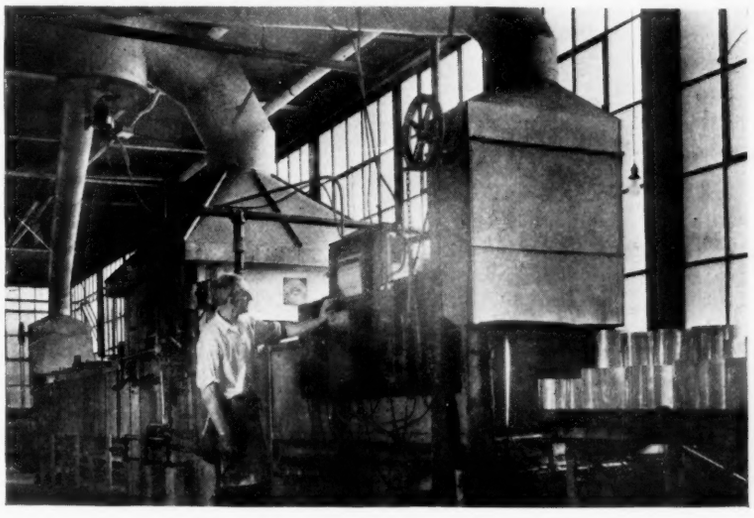
Trading in silver is done through dealers or banks that specialize in handling the metal. The price is determined daily in England and the United States in the following manner.

In London, four bullion brokers meet daily at 1:45 P. M., except on Saturdays when the hour is 11:45 A. M. By matching the buying and selling orders and the balance of their purchases or sales they arrive at an agreed price for the day. The price is quoted in pence and 1/16 fractions per standard ounce, which is 925 fine, but delivery is made in bars weighing approximately 1000 troy ounces—996 fine or better. Two prices are quoted; one for spot cash (that is delivery within seven days) and one for forward, which is delivery in exactly two months from date of sale or purchase.

The New York official price is determined and issued daily, usually about noon, by Handy & Harman. It is now based upon the U. S. Treasury buying rate for foreign silver purchases under the Silver Purchase Act of June 19, 1934. Previously it was based upon the market prices prevailing that day up to the time of issue for delivery of spot silver in round amounts of 50,000 ounces. This official price is quoted in cents and one-eighth fractions and is usually about one-quarter cent below the actual price at which silver can be purchased although this spread may be greater or less later in the day depending upon the trend of the New York market after the official price has been established. This official price is used as the basis of settlement for silver content of ores purchased by smelting companies from producers, with allowance for carrying and marketing charges.

Trading in silver was conducted on the National Metal Exchange later known as the Commodity Exchange, Inc., from June 15, 1931, until August 4, 1934, when the nationalization of silver under the Silver Purchase Act became effective and caused the suspension of trading. Since that time trading in the New York market is done by telephone bids and offers and actual purchases and sales are confirmed by letter.

Since the passage of the Silver Purchase Act of 1934 the world price of silver has been affected principally by the purchases of the United States Government. Briefly this Act declared it to be the policy of the United States to increase the proportion of silver to gold in its monetary stocks until the silver holdings would represent 25 per cent. of the total value and that this proportion should be



A large annealing furnace in the Handy & Harman plant.

maintained. The Secretary of the Treasury was authorized and directed to purchase, at his discretion as to time, quantity and price, enough silver to establish this ratio with the limitation of price set at the coinage or monetary value of $1.29 per troy ounce.

Table 1 gives the high, low and average annual prices of silver in New York for the years 1919 to 1937 inclusive. Figure 1 gives the range in silver prices in the United States from 1910 to 1938 inclusive and the causes of some of the wider fluctuations.

Table 1

Production of Silver

Year	*High*	*Low*	*Average*
1919	1.37½	1.01⅛	111.12
1920	1.37	59¼	100.86
1921	73⅝	52⅜	62.65
1922	73¾	62⅜	67.52
1923	68⅝	62½	64.87
1924	72⅛	62¾	66.78
1925	72⅞	66½	69.07
1926	68⅝	51½	62.11
1927	60	53⅝	56.37
1928	63⅝	56½	58.18
1929	57½	46½	52.99
1930	46⅞	30¾	38.16
1931	37¼	25¾	28.70
1932	31	24¼	27.89
1933	45	24½	34.73
1934	55¾	41¾	47.97
1935	81	49¾	64.27
1936	49¾	44¾	45.09
1937	46¾	42	44.80

An analysis of Table 2, showing production from 1918 to 1937 inclusive, indicates that a reasonable estimate of world production in normal times would be approximately 250,000,000 ounces of which at least 50 per cent. or 125,000,000 can be considered as a by-product of copper, lead and zinc ores.

The exports and imports of the United States are given in Table 3. The imports are, of course, the result of the Silver Purchase Act of 1934 and the increased production in the United States shows the result of the price paid by the Treasury for silver of domestic origin as authorized by the President under power given him by Congress to regulate the currency.

The consumption of silver is given in Table 4. It is of interest to note that the arts and industries only consume a relatively small proportion of the total production and a large part of this silver is in recoverable form. The consumption by different industries is difficult to estimate accurately but silverware either of sterling fineness (925 fine) in the United States and England or of fineness varying from 800 to 900 in other countries is the largest single use; the use in motion picture and photography; silver plated ware and miscellaneous products completes the picture in the order of amounts consumed. Under the miscellaneous group, silver brazing alloys, contacts for electrical apparatus and application in chemical plants are the more important items.

Physical Properties of Silver

Pure massive silver is considered to be the whitest of metals. It has a beautiful lustre when polished and has high reflectivity. It is extremely malleable and ductile. It can be hammered into sheet .00001 inch thick or drawn into such fine wire that 400 feet would only weigh a gram. Although it is hardened by cold working, it is easily annealed at low temperatures.

The recrystallization of silver after cold working is affected by the impurities present, the amount of cold working and the time it is kept at any given temperature. For example, the hardness and other properties imparted to silver by cold working are removed to a great extent by heating from 200° C. (392° F.) to 300° C. (572° F.) for a period of one-half hour. Table 5 gives results of some tests on silver sheet which was 999 plus fine.

The thermal conductivity of silver is higher than that of any other metal and this property makes its use particularly desirable in equipment where heat transfer is an important factor. It also has the highest electrical conductivity.

Chemical Properties of Silver

Silver is highly resistant to attack under ordinary atmospheric conditions unless hydrogen sulfide is present when it becomes tarnished due to the formation of silver sulfide. An atmosphere of dry hydrogen sulfide has little or no effect, but the presence of oxygen and moisture accelerate the attack. From a practical point of view it may be said that silver is not oxidized at temperatures below its melting point. Recent investi-

Table 2

WORLD PRODUCTION OF SILVER (In Millions of Fine Ounces)

Country	*1918*	*1919*	*1920*	*1921*	*1922*	*1923*	*1924*	*1925*	*1926*	*1927*	*1928*	*1929*	*1930*	*1931*	*1932*	*1933*	*1934*	*1935*	*1936*	*1937*
North America	151.7	138.6	135.2	131.2	155.9	175.5	175.4	174.5	181.6	186.7	186.7	192.6	182.4	139.2	113.7	105.5	118.1	131.6	159.9	178.1
Central Amer. & W. I.	2.9	2.8	2.7	2.	2.5	3.	2.7	2.7	3.5	3.2	2.6	2.8	3.9	4.	4.3	4.8	3.5	3.5	3.6	3.7†
South America	14.7	14.8	14.6	15.5	21.4	27.3	26.7	29.3	31.9	25.5	29.1	29.5	23.5	15.1	11.3	13.3	17.	26.7	32.9	32.7
Europe	12.9	8.3	8.3	8.	8.5	8.9	10.3	11.2	11.2	11.6	10.9	11.4	13.5	14.2	15.	15.3	15.8	17.6	18.8	19.7
Australia	10.7	7.6	2.2	5.3	11.5	13.8	10.8	10.9	11.2	11.6	9.6	9.9	10.1	8.6	9.5	11.6	11.2	12.4	13.2	14.1
Asia	10.	8.4	9.	8.9	9.4	10.	11.1	11.7	12.4	13.2	15.	14.8	16.6	14.9	14.	15.2	16.1	17.5	19.2	19.8
Africa	1.3	1.3	1.2	1.	1.3	1.6	1.8	1.4	1.3	1.3	1.3	1.8	2.5	4.8	3.4	4.	4.7	5.2	4.7	5.2
TOTAL	204.2	181.8	173.2	171.9	210.5	240.1	238.8	241.1	253.1	253.1	255.2	262.8	252.5	200.8	171.2	169.7	186.4	214.5	252.3	273.3
Above figures taken from American Bureau of Metal Statistics Year Book.																				
Other Supplies* No figures available	43.	45.	20.	7.	.7	18.4	60.	67.	71.5	68.5	47.1	103.8	258.	391.5	304.	189.5				
TOTAL	253.5	285.1	258.8	248.1	253.8	271.5	315.2	329.8	324.	269.3	218.3	273.5	444.4	605.	556.3	462.8				

*Handy & Harman Estimate
†Estimated

Table 3

Imports of Silver Bullion Into the United States (oz.)

From	*1932*	*1933*
Australia	....	9,135
British India	512,678	20,000,393
Canada	2,075,314	3,529,876
Chile	161,841	....
China	1,977,524	49,342,660
Colombia	200,094	150,910
Cuba	473	....
Equador	8,545	....
England	1,373,489	23,575,551
France	....	1,000,000
Guatemala	143,500	....
Honduras	3,158,683	3,604,869
Hongkong	....	1,578,300
Japan	171,411	268,052
Mexico	23,839,381	37,306,397
Netherlands	....	68,343
Netherlands, East Ind.	913,152	292,158
New Zealand	884	208
Nicaragua	36,477	19,499
Panama	181,406	....
Peru	121,286	212,246
Philippine Islands	....	5,536
Salvador	12	117
Trinidad & Tobago	144	113,883
Venezuela	400	....
Total	34,876,694	141,078,133

From	*1934*	*1935*	*1936*	*1937*	*1938*
Argentina	....	....	....	....	23,925
Australia	....	....	1,416	33,408	5,448
Belgium	9,970	....	....	....	....
Bolivia	....	10,932	....	....	....
British India	....	286,887	5,498,562	....	349,971
British Malaya	....	....	....	....	1,310,000
Canada	4,357,934	21,435,076	13,576,745	11,885,903	22,565,628
China	7,926,266	493,166	14,310,450	4,312,725	....
Colombia	199,808	....	4,175	2,312	....
Costa Rica	....	322	....	....	....
Cuba	390	....	....	....	....
England	85,044,164	383,636,389	97,291,991	37,081,859	83,081,723
France	....	....	....	217,447	64,669
Germany	4,212	....	....	816	399,600
Honduras	1,012,636	....	29,218	....	....
Hongkong	4,234,225	3,130,294	3,890,000	....	....
Japan	702,937	413,503	3,976,442	2,872,594	6,887,125
Mexico	37,823,698	64,654,631	56,167,206	52,431,886	76,852,620
Netherlands	....	....	....	....	100,000
Netherland West Indies	71	....	....	....	....
Peru	127,434	....	....	....	....
Salvador	2,054	....	....	....	....
Venezuela	300,618	....	....	....	....
Total	141,746,417	474,061,200	194,746,205	108,838,950	191,640,709

Exports of Silver Bullion From the U. S. (oz.)

From New York to	*1932*	*1933*
Argentina	3,215	....
Canada	1,464,985	1,622,194
China	20,946,970	11,354,496
Colombia	73,183	....
England	1,332,326	8,911,297
France	295,839	150,954
Germany	2,404,718	....
India	852,089	....
Japan	451,993	....
Netherlands	....	592,961
Norway	8,830	....
Panama	....	205
Peru	....	1,603
Trinidad	3,200	4,480
Total	27,837,406	22,638,190
From San Francisco to		
China	11,297,165	9,292,037
England	674,083	8,818,172
Hongkong	2,378,405	2,409,026
Netherlands	....	118,128
Total	14,349,653	20,637,363
TOTAL	42,187,059	43,275,553

From New York to	*1934*	*1935*	*1936*	*1937*	*1938*
Belgium	10,135	....	....	....	....
Brazil	....	....	....	6,500	....
Canada	4,047,002	4,604,378	2,733,253	1,170,094	1,557,484
China (incl. Hongkong)	1,902,650	....	....	....	....
Colombia	....	....	....	....	35,442
Cuba	....	....	....	....	11
England	12,952,156	639,846	35,785	434,449	199,923
France	100,522	5,074	....	....	....
Germany	....	....	....	465,567	....
India	751,226	....	....	....	....
Italy	....	25,025	1,177	....	....
Japan	....	....	....	5,680	....
Panama	....	....	....	170	....
Peru	....	....	....	....	455
Philippine Isls.	....	....	....	....	100
Switzerland	....	5,049	....	....	....
Trinidad	....	....	3,984	10,975	1,800
Venezuela	....	....	....	....	100
Total	19,763,691	5,279,372	2,774,199	2,093,435	1,795,315
From San Francisco to					
England	1,610,682				
Hongkong	348,488	....	....	....	....
		....	....	....	....
Total	1,959,170	....	....	....	....
TOTAL	21,722,861	5,279,372	2,774,199	2,093,435	1,795,315

gations have indicated that an oxide film will form at 185° C. but this is unstable and breaks down at higher temperatures.

Molten silver has the unique property of absorbing approximately 20 times its own volume of oxygen. The greater part of this oxygen is given up when the silver solidifies before cooling and the generally accepted theory is that an oxide of silver is formed which is unstable below the melting point. This oxygen reaction with silver is important because if proper technique is not employed in melting and casting, there will be sufficient oxygen left in the cast bars to cause cracking if the attempt is made to fabricate them into sheet or wire and the castings themselves may be full of blow holes.

Older text books stated that silver was not dissolved by hydrochloric acid but a more correct statement would be that hydrochloric acid attacks silver and a coating of silver chloride is formed which tends to inhibit further attack. The resistance of silver to the halogens will depend upon the concentration of the solutions and temperature. The attack is much more rapid in the presence of oxygen, and boiling solutions having 50 per cent. or more hydrochloric acid by volume have a solvent action on the coating of silver chloride so that the silver is slowly and progressively dissolved. When dilute solutions are used at lower temperatures the silver chloride coating resists further attack to a degree that makes silver a satisfactory metal for use in chemical equipment in many cases.

Table 5

Properties of .032" Ga. Fine Silver

Anneal	Sclero-scope	Rockwell 1/16" Ball 60 kg.	Cupping Depth In.	Test Pressure Lbs.	Elastic Limit Lbs./Sq. In.	Tensile Strength	Elong. % in 2"
Hard 50% Red.	27	91.0			44,300	54,300	2.4
200° F.	27	91.0	.140	750			
400° F.	11	49.0	.301	1000	16,000	26,500	43.7
600° F.	9	39.0	.328	1000	13,200	25,000	51.6
800° F.	8	33.0	.332	1000	11,500	25,000	51.5
1000° F.	7	30.0	.330	950	10,600	24,100	50.8
1200° F.	6	11.5	331	1000	7,900	22,900	53.9
1400° F.	6	9.8	.327	1000	7,800	22,500	48.4

Boiling concentrated sulfuric will dissolve silver. The action of either dilute solutions or cold concentrated solutions is negligible unless oxidizing agents are present.

Action of Nitric Acid

Silver is dissolved by hot nitric in all concentrations and at one time this acid was used commercially for parting silver from gold, but has been superseded by the sulfuric and electrolytic processes because of greater economy. The action of nitric on silver has been studied by many investigators and it appears to be well established that nitrous acid is an important factor and if this acid or an oxide of nitrogen is not present pure silver will not dissolve in nitric, particularly if the temperature is not raised above 20° C. (68° F.) and the specific gravity is below 1.405. Impurities and the form of the silver also affect the rate at which the silver dissolves. Practically it may be said that nitric acid in all concentrations is an excellent solvent for silver as nitrous acid is present or is formed quickly when the solution is warmed.

Table 4

Silver Consumed in the Arts & Industries

(In Millions of Fine Ounces)

Year	*Germany*	*England*	*U.S. and Canada*
1938	14.3	12.	27.5
1937	15.9	15.	31.5
1936	16.	12.	26.5
1935	15.	10.	23.5
1934	12.4	13.	25.
1933	14.5	8.	24.
1932	...	8.	22.
1931	28.2	10.	30.5
1930	8.	6.	29.5
1929	12.	6.5	37.
1928	10.8	6.	33.5
1927	16.7	6.5	33.5
1926	12.5	6.	33.5
1925	14.3	5.	31.
1924	...	4.5	28.
1923	...	4.	29.2
1922	...	4.5	24.
1921	...	2.5	18.
1920	...	4.	23.
1919	...	...	25.
1918	...	...	15.

Phosphoric acid will dissolve silver slowly if used in concentrations from 65 per cent. to 85 per cent. H_3PO_4 and heated to temperatures above 200° C. (392° F.). When used in the latter concentration silver is slightly attacked at 120° C. (248° F.). Silver is highly resistant to acetic and unless some oxidizing agent or impurity is present it is not attacked to any appreciable degree. Organic acids as a rule do not attack silver. There may be exceptions and the presence of some oxidizing agent may cause a slight attack.

Caustic alkalies have but slight if any effect on pure silver and can be melted in silver crucibles with no appreciable loss in weight of silver. When molten caustics are kept in contact with silver for long periods of time in open crucibles there is a slight attack at the air line probably due to the effect of oxygen in the air. Ammonia gas and liquid ammonia have practically no effect on pure silver if free from chlorides.

Table 7

Acetate rayon
Acetic acid
Acetic anhydride
Acetone
Acetyl salicylic acid
Alum
Aluminum sulfate
Ammonia
Ammonium carbonate
Ammonium chloride
Ammonium hydroxide
Ammonium sulfate (sat) plus 5% sulfuric acid
Aniline dyes
Aqua regia
Arsenic acid solution
Artificial silk industry (see acetate rayon)
Atmosphere
Beer
Benzoic acid
Beverages
Bismuth oxide
Boric acid
Brewery fluids
Brom-fluoride
Caesium hydroxide
Carbolic acid
Carbon dioxide
Carbon disulfide
Carbon tetrachloride
Carbonic acid
Chlorine
Chlorine vapor-moisture
Cider
Citric acid
Coal tar products
Cupric chloride, cold
Cupric sulfate (10%) + 2% sulfuric acid
Cupric oxide
Cyanogen
Dairy products
Dyestuffs
Essential oils
Ether (ethyl)
Ethyl chloride
Fatty acids
Fluorides
Fluorine
Foodstuffs
Formaldehyde
Formic acid
Fruit juices and extracts
Gelatine
Glue
Glycerine
Halogen gases
Hydrochloric acid, dilute
Hydrofluoric acid
Hydrogen
Hydrogen chloride
Ink
Iodine solution
Iron oxide
Jellies
Lactic acid
Lead oxide
Magnesium chloride
Magnesium sulfate
Malic acid
Marmalade
Methyl salicylate
Nitric oxide
Nitrogen
Nitrosylchloride
Oleic acid
Organic acids
Oxalic acid
Oxygen
Ozone
Palmitic acid
Pectin
Pharmaceuticals
Phenol
Phosphates
Phosphoric acid
Phosphoric-hydrochloride acids
Photographic emulsions
Potassium chloride, solution
Potassium dichromate
Potassium hydroxide
Propionic acid
Phthalic acid
Rayon
Rubidium hydroxide
Sea water
Sodium bicarbonate
Sodium borate
Sodium carbonate
Sodium chloride
Sodium hydroxide
Sodium metaphosphate
Sodium nitrate solution
Sodium phosphate—dibasic
Sodium phosphate—mono-basic
Sodium sulfate
Stearic acid
Sulfuric acid (under 60%)
Sulfurous acid
Sulfuryl chloride
Tanning industry
Tartaric acid
Tetraethyl lead
Urea
Vinegar
Water
Water vapor
Wines
Zinc chloride
Zinc oxide

Table 6

Physical Properties of Fine Silver

Atomic Weight 107.88
Density 10.5g./cm.³ 20° C. (68° F.) .378 lbs./Cu. in.
Young's Modulus (7.28 x 10⁷ dynes/cm.² at 30° C.
" " (10.3 x 10⁶ pounds/in.²
Thermal Conductivity 1.0 $\frac{\text{Cal.}}{\text{Sec. cm.}^2 \text{ ° C./cm.}}$ at 20° C.
Electrical Resistivity 1.59 michrom. – cm.
Specific Heat .0562 CaL/gram/° C. at 20° C.
Mean Coefficient Thermal Expansion 1.9 x 10 $^{-5}$/° C. 0° to 100° C.
Optical Reflectivity (region of spectrum most sensitive to eye) 95%
Melting Point 960.5° C. 1761° F.
Boiling Point 1955° C.
Ultimate tensile strength – annealed 18,000 to 23,000 lbs./sq. in.
Elongation 50% in 2"
Brinell Hardness – Annealed 25-35
Rockwell F. (1/16" dia. ball – 60 kg.) 10-30

Silver should be considered one of the most corrosion-resistant metals that we have. Unfortunately, only a limited amount of information regarding actual service results in commercial plants is available. Laboratory tests have been made on a large number of different chemicals and products to determine their effect upon fine silver, but the results of these tests can only be taken as indicative of what may be expected. Particular conditions involving the use of the same corrosive agent may vary sufficiently to cause a considerable difference in the results.

The list given in Table 7 contains a number of corrosive agents and other products for which fine silver offers satisfactory resistance according to reports which have been received from different sources. The American Silver Producers Research Project has checked over the different items in this table but it should be recognized that the tests upon which these results were reported are not necessarily conclusive and the table is given as a matter of general information and further investigation and tests should be made for any specific application.

Industry's Bookshelf

Practical Organic Chemistry, by F. G. Mann and B. C. Saunders; Longmans-Green, London; 418 pp., $2.75. An English text that literally lives up to the overworked adjective of its title—a second edition in two years.

Applied Mathematics in Chemical Engineering, by Thos. K. Sherwood and Chas. E. Reed; McGraw Hill, N. Y.; 402 pp., $4.00. Calculus ably translated into the terms of the chemical plant—a thoroughly modern and satisfactory work.

Government Spending and Economic Recovery, by Chas. F. Phillips and J. V. Garland; H. W. Wilson Co., N. Y., 404 pp. Packed with facts and figures, full of references for further reading; equipped with a set of "true or false" questions with page notations for checking—a storehouse of data on this subject.

Who's Who in Commerce and Industry, 1938; Inst. for Research in Biography, N. Y.; 1010 pp., $15.00. Remarkably complete who's who of major executives of the larger companies and most valuable for inter-industry and international references.

Personal and Business Record Keeping, by F. H. Elwell, E. A. Zelliot, and H. I. Good; Ginn & Co., Boston; 494 pp., $1.72. One of those ultra-modern texts with attractive colored pictures, workaday examples, and covering everything from an address card index to an income tax blank.

Income and Wealth, Natl. Bureau of Economic Research, N. Y.; 2 vols., 348 pp., and 327 pp., $5.00. A series of papers and discussions of them that emphasize the points of these debatable economic concepts wherein "the doctors disagree"—a stimulating and useful collection.

Oxidation Potentials, by Wendell N. Latimer; Prentice-Hall, N. Y.; 352 pp., $3.00. A good working base book in thermodynamics that has been long needed.

Modern Cosmetics (2nd Ed.) by Francis Chilson; Drug Markets, Inc., N. Y.; 564 pp., $6. Revsied and enlarged, with up-to-date information on formulation and manufacture of cosmetics. Chapters on equipment design, plant layout and packaging should prove especially helpful.

Canadian Trade Index (1939 Ed.) compiled and published by Canadian Manufacturers' Association, Inc., Toronto; 842 pp., $6. Authoritative directory to Canadian manufacturers and their products. Volume is of handy size, and material well-organized. Included is cross-reference index to the English text, in French.

Leçons sur les Essais de Matériaux: Part I, Structure et Déformation des Solides (18 fr.); Part II, Essais des Métaux (25 fr.) by R. L'Hermite; Hermann & Cie, Paris. Part I describes methods for radiometallurgical examination of metals and alloys; Part II considers apparatus for physical testing, with special reference to methods for steel rails.

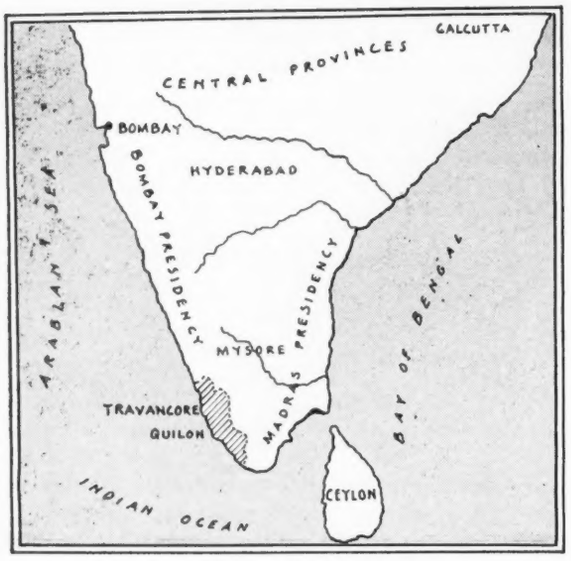
Industrial Political Economy, by E. H. Hempel, Pitman, N. Y.; 454 pp., $3.50. A man of wide practical experience and thorough economic training examines the industrial picture of today in the light of history.

Mineral Valuations of the Future, by C. K. Leith, Amer. Inst. Mining & Metallurg. Engrs., N. Y.; 116 pp. Supplies appraised and new demands weighed in the light of recent technological and political developments.

Strikes, by John I. Griffin, Columbia Univ., N. Y.; 319 pp., $4.00. All available pertinent statistics on American strikes for the last 57 years: with a cold-blooded commentary on the nation's labor troubles—exceedingly valuable compilation.

Pittsburgh Coal Bed, by Howard N. Eavenson, Amer. Inst. Mining & Metallurg. Engrs., N. Y.; 55 pp. with folding maps. A history of the most important (from our industrial viewpoint) coal deposit in the United States.

Fascism & Big Business, by Daniel Guerin, Pioneer Publishers, N. Y.; 339 pp., $2.00. A view from the extreme left wing of the French Socialists which is a delightful exposé of the differences (sic) between various European political ideals.



Map of Southern India.

ZIRCON ILMENITE and MONAZITE

Mining In India

By Gordon H. Chambers

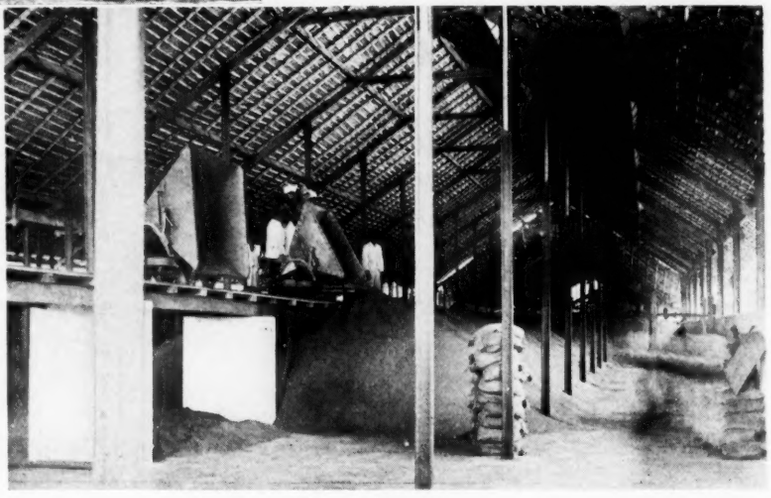
The amazing expansion in the use of titanium pigments is well recognized, but very little is known of ilmenite, the raw material, and where and how it is obtained, nor about the accompanying minerals, zircon and monazite. Mr. Chambers, vice-president, Foote Mineral Company, describes the methods of mining, discusses various properties, and summarizes the uses for each of the three vital minerals.

TRAVANCORE is a state which lies on the tropical southwest coast of India. Looked at romantically, it is a fascinating 7,625 square miles of hills and valleys where elephants are numerous and tigers are found in the forests. But to the industrial world Travancore means only one thing—the source of shipload after shipload of ilmenite plus smaller quantities of the accompanying minerals, zircon and monazite. This picturesque district has produced close to 900,000 tons of ilmenite so far and furnishes an overwhelming proportion of the world supply. The United States is by far the leading producer of titanium pigments and consequently is the largest purchaser of this Indian ilmenite. In 1937 United States ilmenite imports from India were 151,971 long tons and only 2,000 tons were imported into the United States from other countries.

Gathering the crude black sand near Quilon. A great many laborers are employed in this operation. The sand is loaded in small baskets and carried on the heads of the workmen to the tram cars.

Zircon, monazite and ilmenite are minerals found in granite and other rocks of igneous origin. All three of the minerals mentioned are extremely resistant to weathering so that when the granite weathers, these more resistant minerals are carried by streams toward the sea and they are found in minute quantities in beach sands in many parts of the world. Travancore, however, is a particularly favorable location because it has a great number of rivers, the floods of which are held back by the peculiar action of the Arabian Sea, forcing the water to spread out into lagoons. The minerals carried down stream are thus being continuously deposited and concentrated by the sorting action of the waves into layers of "black sand."

The proportions of zircon, monazite and ilmenite vary considerably at different



Storage warehouse for refined ilmenite. The sand is being discharged from dump cars.

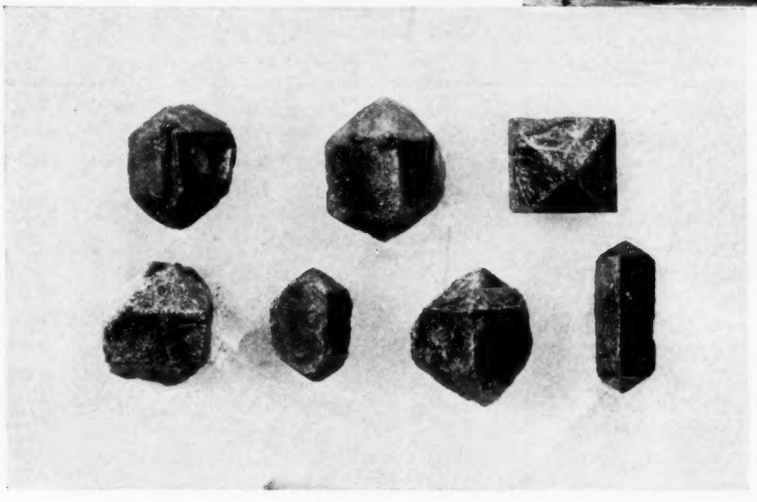
points along the Travancore coast and between the productive spots there are long stretches of almost barren sand. Two deposits are being exploited at the present time. The most important of these is near Quilon and is worked by two large concessionaires, F. X. Pereira & Company* and the Travancore Minerals Company. The present Dewan, or Prime Minister, of Travancore is ultra nationalistic and has refused to grant any further concessions in the Quilon area.

The second source is the Colachel deposit, about 70 miles southeast of Quilon, but it is of limited extent and produces lower grade ore than the Quilon section. The Colachel area is being worked by a British firm, Hopkins and Williams. This beach produced nothing but monazite from 1911 until about 1922, there being little market at that time for ilmenite and zircon. The richer ore reserves of the Colachel area have now been largely depleted and judging from Indian statistics it would appear that costs are rising probably due to working poorer sands.

The Quilon productive district extends for about 15 miles along the coast of Nindikarai Inlet. It is interesting to note that in the 13th Century Marco Polo visited here during his famous travels and reported it to be one of the busiest ports in the world. He mentioned that there was a great abundance of ginger, pepper and gold ornaments. He also warned that there were many "pirates of the most desparate character" and that anchorages along the seacoast were unsafe because of the "treacherous sands." Marco Polo would undoubtedly be astonished to learn that this treacherous sand is now shipped to all parts of the world.

In both districts the crude black sand is gathered not only from the beach but also from highly concentrated layers of sand buried under dunes some distance back from the beach. G. H. Tipper of the Indian Geological Survey explains that the concentration of these minerals in the sand dunes is due to wind action while on the beach it is due to the sorting action of the waves on steeply inclined beaches. A general view of the open pit operations of F. X. Pereira & Company at the sand dunes north of Quilon is shown on page 20. The sand is gathered by means of a hoe-like tool and placed in baskets, then carried on the heads of the laborers to mine cars to be transported to the concentrating mill. The crude ore is screened, dried and most of the ilmenite is removed by electro-magnetic separators. Both wet and dry concentrating tables are used to separate the zircon, rutile, garnet and monazite and they are finally purified by repeatedly passing them through electro-magnetic and electrostatic separators. The zircon and monazite are marketed but up to the present time little has been done with the rutile and garnet. The Foote Mineral Company laboratory has made a number of tests on the rutile and small quantities have been shipped to the United States. Garnet sand could be obtained in moderately large amounts at Travancore but these water-worn grains have no sharp edges and are not as valuable for abrasive use as the crushed and graded garnet obtained from rock.

Full length view of administration building, concentrating units and several warehouses of F. X. Pereira & Company on a backwater canal not far from the sea. The small picturesque barge in the foreground is the type used for transporting the ilmenite to the steamers which anchor off the coast.



Zircon crystals magnified to show typical crystal forms.

The ilmenite from the Quilon area is the highest in titanium dioxide of any commercial deposit in the world. A composite analysis, based on the average of the last eight shipments to Foote Mineral Company, is as follows:

TiO_2	60.35%
Fe	22.69%
SiO_2	0.41%
S	0.01%
P	0.03%

For many years this mineral had no characteristics which seemed useful, in fact its presence in iron ores

* The Foote Mineral Company is the exclusive American sales agents for F. X. Pereira & Company.

was a decided disadvantage. Then, about 25 years ago, it found a use as the raw material for manufacturing ferro-carbon titanium. This industry still requires substantial tonnages, but the amazing growth of Indian ilmenite is based primarily on the new titanium dioxide industry. The first commercial production of the white oxide was probably in 1919, and in 1922 Travancore made its first shipment of ilmenite. The accompanying chart illustrates how rapidly Indian ilmenite production has increased to keep pace with the fast growing demand from the manufacturers of titanium pigments. Indian ilmenite seems assured of a steady market during the next few years as the uses of titanium dioxide are still expanding. A recent and perhaps optimistic survey* estimated that the sales of titanium pigments in the United States totalled 126,000 tons in 1937, of which 77,000 tons were composite pigments such as titanium oxide-barium sulfate and 49,000 tons were sold as the pure oxide. These 126,000 tons were distributed to the following industries.

Paint	83,000 tons
Paper	12,000 tons
Rubber	8,000 tons
Floor coverings	8,000 tons
Leather dressings, etc.	2,000 tons
Export	2,000 tons
Ceramic, Welding, Ink and miscellaneous	11,000 tons

The monazite sands of Travancore were discovered in 1909 by C. W. Schomberg and production began in 1911. At that time Brazil was the principal supplier but the Indian sand contains one-third more thorium oxide and was therefore preferable. Consequently, the Brazilian mines were forced to curtail their output and since 1917 India has been the largest producer of monazite. A recent shipment of monazite from the Quilon area in Travancore to Foote Mineral Company had the following analysis:

Thorium Dioxide	8.3%
Cerium and other rare earth oxides	61.7%
Iron Oxide	0.1%
Phosphoric Anhydride, about	29.0%

Two wet vibrating tables with pit for middlings. Some of the quartz is removed in this operation.

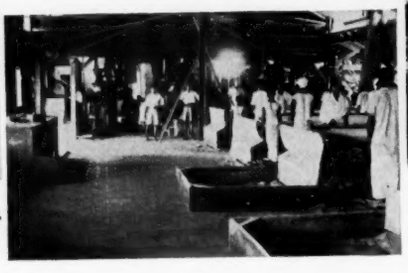
In 1885, Auer von Welsbach devised the incandescent gas mantle in which an essential element was thorium nitrate, made from monazite sand. The Welsbach gas mantle and its satellite, monazite mining, flourished for 30 years and then the gas mantle was gradually supplanted by the electric lamp. For this reason, as shown on the chart, Indian monazite production began to decline in 1919 and almost ceased between 1922 and 1933. Up to that time there was very little market for the cerium and rare earths obtained as a byproduct in extracting the thorium from monazite. Limited amounts have been used for many years in ferrocerium, the pyrophoric alloy which is employed as the flint in cigarette lighters, but most of the cerium could not be sold. Gradually new uses for cerium have developed such as in mildew proofing cloth, as a colorant in topaz yellow glass, as an arc stabilizer in carbon arc lamps and as an opacifier in enamel. And so monazite is now mined primarily for its cerium content and the chart indicates that production in India is again on the upswing. The export statistics indicate that it has averaged 2,500 tons annually during the past four years.

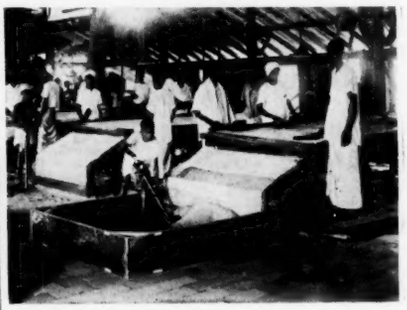
Indian zircon exports, like ilmenite, have been decidedly on the increase but with much more irregularity. The sharp fluctuations shown on the chart are due principally to competition from the Australian zircon deposits, and if the Indian and Australian production figures were combined for the past 15 years it would show that the world consumption of zircon has risen steadily and rapidly. During the last few years Indian

* Chemical & Metallurgical Engineering, Feb., 1939, Page 127.

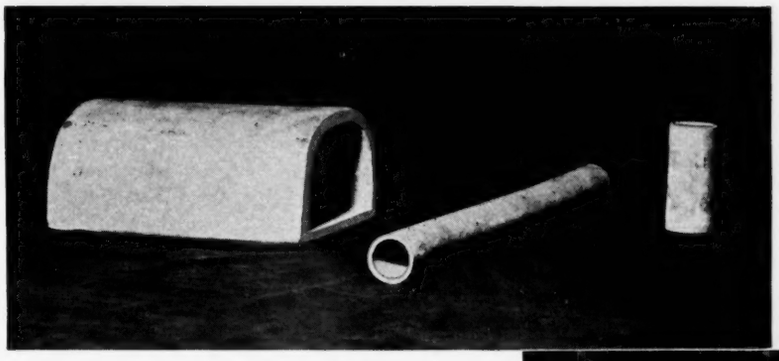
Steel tram cars are used in transporting the sand to the concentrating plant.

Zircon, ilmenite and other minerals are concentrated on these dry vibrating tables and on the magnetic separators in the background.





The laborers use brushes to separate the tailings from the middlings on the dry vibrating tables.



Zircon Refractories.

exports have averaged about 2,650 tons annually.

A composite analysis of many shipments from F. X. Pereira and Company to Philadelphia is given below:

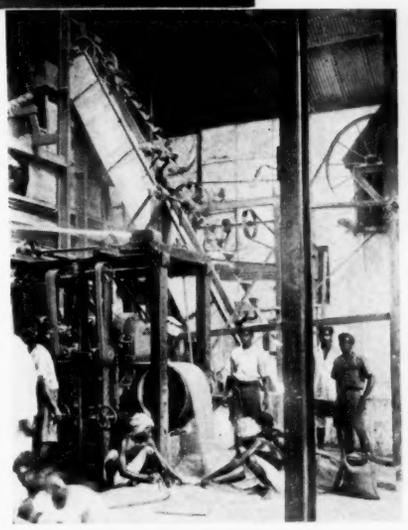
ZrO_2	66.80%
SiO_2	31.50%
TiO_2	0.84%
Fe	0.08%
P_2O_5	0.07%

One of the first commercial uses for zircon was in refractory crucibles and for this purpose it has some excellent properties. It has the lowest linear thermal expansion among the usual ceramic raw materials, having even less expansion than Sillimanite and fused aluminum oxide. It has a melting point of about 4622° F. and a softening point of approximately 3272° F. For these reasons zircon refractories show excellent resistance to spalling and fusion except in the presence of iron oxide and certain basic fluxes.

Zircon is of even greater interest in the field of specialized porcelains. Vitreous porcelain bodies containing 30 to 70 per cent. zircon have a long firing range, exceptional mechanical strength, good heat shock resistance and remarkable dielectric strength at high temperatures. All of these properties are particularly necessary in electrical insulators.

Considerable quantities of zircon sand are also employed in refractory insulating cements for electrical appliances as well as in sand molds for stainless steel and alloy castings.

Zircon is now used in certain types of heat resisting glass and it is possible that the glass industry will eventually be the largest market for this versatile mineral. The most desirable feature of zirconia glasses is their greater impact strength and thermal endurance. In other words, the addition of zircon to the batch produces a tougher glass which is less likely to break in use. It also increases the chemical durability of glass, particularly its resistance to caustic soda. Until recently these advantages were outweighed by the cost but the present low market price of zircon now puts it approximately on a parity with alumina.



A Wetherill magnetic separator. The sand cascading from the belt is refined zircon which is being bagged by the laborers.

Zircon is also the usual raw material for manufacturing zirconium oxide and zirconium salts. The most important of these are the zirconium opacifiers which to a large extent have supplanted tin oxide in vitreous enamels and ceramic glazes. Other zirconium compounds such as the pure oxide, tetrachloride and tetraiodide are used in producing zirconium metal. The metal is used in photoflash bulbs, radio transmitting tubes, ammunition primers, spot welding electrodes and a number of other unusual applications.

There is a strong temptation, in presenting these graphs and photographs, to discuss the production of zircon, ilmenite and monazite in other countries and to describe in detail the various industrial uses for these interesting minerals. But limitations of space prevent this and it is scarcely necessary, since this information can be gotten from the articles listed below. In brief, Travancore is the world's leading producer of all three of these beach sands and the charts show that production has grown at a phenomenal rate.

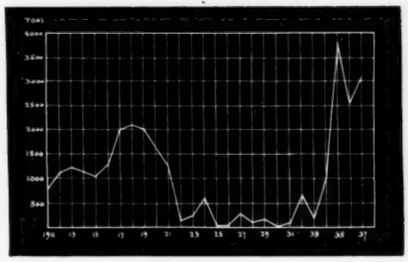


Chart showing the exports of Indian monazite from 1911 until 1937.

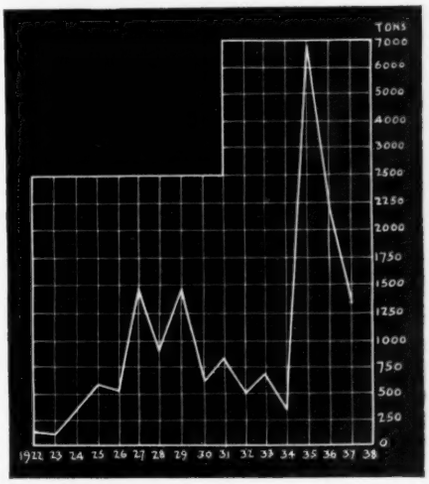


Chart showing the fluctuations in Indian zircon exports from 1922 until 1937.

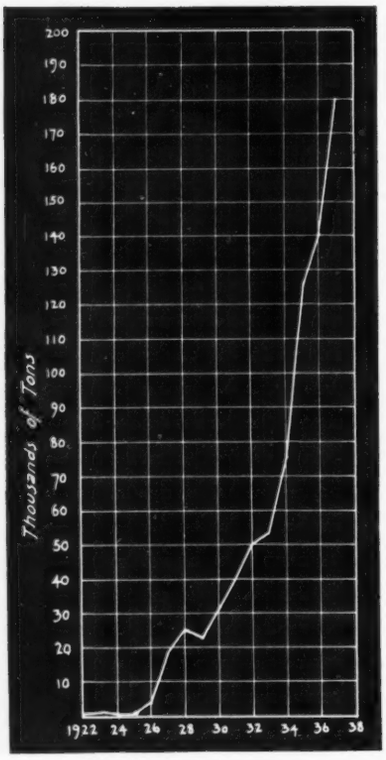


Chart showing the rapid increase in the exports of Indian Ilmenite from the first shipment in 1922 until 1937. Production is still rising.

The other interesting feature of this new industry in India is the strange blending of primitive hand labor with the most advanced electrical equipment. The mining companies use complex electrostatic and electromagnetic separators and, in sharp contrast, they employ almost no mechanical handling equipment. Labor is so cheap that it is more economical to gather the sand in baskets and use manual labor in other operations which would necessarily be completely mechanized in this country.

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Plant Ventilation

Modern methods of housing chemical equipment are discussed by G. B. Jones [works manager of the Huddersfield works of Imperial Chemical Industries (Dyestuffs Group)] in an article in the "I.C.I. Magazine" of June, house organ of the Imperial Chemical Industries. The article is accompanied by numerous illustrations of the different methods used at Huddersfield for sheltering plants and the workers engaged on them.

Some years ago, says Mr. Jones, it was the practice to put up a shed and erect a plant inside it. Under modern conditions in I.C.I. a plant is designed and then the building or shelter is placed over and around it, in order to give the best working conditions while the plant is being operated.

In one building the walls are made of checkered brickwork, 4½ in. thick. On two sides the bottom section of the walls is omitted. This ensures good general ventilation. Rather surprisingly, perhaps, there are no strong drafts in this type of building. The checkered brickwork prevents this, also snow and rain are not driven into the building through the holes. A corner of the lower floor has a portion of solid brickwork, and this forms an area where records are kept. In cases where there is the possibility of steam and heat the process workers, continued Mr. Jones, find the conditions in a building of this type much pleasanter than in the normal type of building with solid walls. There is no argument as to when windows are to be opened or closed, no necessity for the cleaning of windows or the repair of window fittings, and the holes provide ample natural lighting.

In another type of building, where the checkered brickwork is used in a different way, the walls are made up on each floor in three sections. First, there is solid brickwork, then a row of windows, and checkered brickwork at the top for ventilation purposes. The plant in this building has to be maintained at a higher temperature than atmospheric, and the brickwork is provided to ensure that there is sufficient ventilation. The solid brickwork at the bottom gives sufficient protection to plant operators who have to remain at a particular point for some time.

The Trend Towards "Fresh-Air" Plants

A further decrease in the number of walls is found in a building which houses equipment which includes a tall column, which has to have protection against the weather and is therefore erected in one corner against a solid wall of bricks. On one long side facing the prevailing wind, checkered brickwork is provided; the other two sides are open except for one portion where the plant records and the control panels are situated. When this plant has to be cleaned or dismantled for repair, it is necessary to have good ventilation, and the construction of the building housing it enables the engineering workers to have the maximum protection when they are doing this work. The plant below the high portion of the building has a roof only; this is for the protection of storage tanks, and there is also an area for drum filling. At the back of the brickwork is a low building of solid brickwork, housing moving machinery which has to be completely protected.

Another plant is covered only by a roof, without any side walls. The roof projects beyond the plant area. This type of housing is suitable for processes where no solid products have to be handled, and all operations take place in a closed system. It gives the maximum amount of natural ventilation. When repair work has to be carried out, loose canvas screens are erected on the weather side. These are available also for use during stormy weather. It is a surprising fact that very little rain is driven on to the equipment.

Many chemical plants can be placed wholly or partly in the open air, especially where leakage is likely to give rise to fume, and experience shows that it is difficult to ventilate a building so as to produce the same conditions as the open air. Complete open air conditions are only possible, however, where process work has to be carried out intermittently. Where a man has to stand at work at one point for some time it is necessary to give local protection.

Attitude of the Workmen

There is a tendency to place more equipment in the open air or under a roof only. Such plants are referred to locally, says Mr. Jones, as "fresh-air" plants, and if a worker is transferred from a plant housed in a building where the atmosphere is warm he naturally feels it a great change to work in the open air. The Huddersfield works medical officer and safety officer are great advocates of these "fresh-air" plants, provided that the clothing worn is adequate, and there have been no complaints once a worker has become used to the conditions. *Chemical Trade Journal*, June 16, p. 556.

CHEMICALS
in the
Textile Industry

The second lecture in the series sponsored by the Chemical Salesmen's Association on the use of chemicals in the principal consuming industries was prepared by Dr. J. F. X. Harold. The paper was read by Robert T. Baldwin at the Chemists' Club (N.Y.) on May 20 because of the illness of Dr. Harold. The author provides some sound advice to salesmen, particularly on the selling of a new product and the place consumer service should occupy in its relation to selling.

A DISCUSSION of chemicals in the textile industry is a large subject and compels generalizations no matter how tempting a few specific items may appear. Salesmen are the victims of much advice, and most of the advice is probably bad in the sense that it is well meant and provided for conditions that often do not exist. There is a terrible reality about the business of confronting a bored, indifferent or tired purchasing agent. Your speaker has been engaged at intervals over 30 years in both buying and selling. As things go, he has generally managed in both capacities to get some comfort out of the personal belief that the chemical industry is unlike any other in that chemicals are the most interesting goods of all goods. They are truly endless in variety and use. Just about the time that you decide you know everything about a chemical and its uses, you awake to find that you are confronted with the competition of an old or new chemical or that your particular chemical is susceptible of a new use or is losing or has lost an old use. It is perhaps fortunate that what sociologists call the "cultural lag" plays a part in the application of chemicals. In other words, there is a breathing spell in the technical competition among materials but not among men.

I ask your indulgence while I endeavour to explain a few of my purely personal views of competition among chemical goods for the textile industries. For this purpose I shall include rayon and other man made fibres as textiles, looking to the use for classification and not to the method of manufacture.

The textile industry of burlap, cotton, linen, silk and wool is old and conservative. Aside from dyes it has not had the wealth of applied engineering and chemistry lavished on it as have some of the newer industries. The business of weaving and spinning has merely been speeded up somewhat, but the essentials were unchanged until Chardonnet's invention of extruding rayon filament. Indeed, it would appear that your own commercial rivalries and not calls for aid from the textile industry, have given the textile industry most of its better improvements in the last quarter century. It may truly be said that the chemical industry has enriched every industry that could be persuaded to buy its goods.

Such staples as caustic soda, carbon disulfide, detergents, dyestuffs, fillers, hydrochloric acid, soda ash and soluble oil are much better in quality than they were a few years ago. The packaging is better, and last, but not least, the package plus a knowledge of the nature of dangerous articles has promoted safety first.

The fragmentary nature of private and public statistics of chemicals and textiles makes it impossible to do more than speculate on how chemicals, fashion, lack of export, decrease of imports, purity of chemicals and science generally have changed the textile industry. Fashion has thrown away two petticoats and provided two bathing suits per season; exports and imports are in chains, and natural fibres are increasingly threatened with man-made fibres. Statistics would be valuable.

Looking at the chemical industry as a unit, it does not matter much whether the textile industry takes X tons of acetic acid for the dyeing of aniline black cotton piece goods or equivalent acetic anhydride for the manufacture of synthetic fibre. It matters much in individual cases. On the other hand, if spinning of natural fibres is presently displaced by the extrusion of "chemical" fibres the changes may be profound. We all know that the viscose rayon industry consumes far more caustic soda than the cotton textile industry, and this is true although the use of caustic soda per unit of viscose rayon has decreased. There is more rayon and less mercerized yarn. Is it too far away to say that man-

made fibres derived from a few raw materials may yet cost us plenty of warp size, oils, dyestuffs, etc.? Will we get a compensating use or uses in that event? In a relatively few years carbon disulfide has grown from the business of a few drums for poisoning prairie dogs to a business of train loads for the viscose rayon industry; one-fifth of all the caustic soda made has been consumed by the same industry; bleaching powder is but a relic of its former use and sodium hypochlorite is in turn ousted by peroxides for some specialty bleaching; alum has lost business to chlorine in water purification; the rapid rise in steam pressures has made the all but perfect application of high purity chemicals to feed water a vital thing. These are but a few examples.

Based on 24 years practical experience in the textile and related industries, I believe that chemical salesmen should think of a textile consumer beginning with the water supply and ending with the stencil ink on the package of finished textile. Water is a vital chemical in all textile industry. Some have to buy water and nearly all have to purify it. A cotton piece goods bleaching, dyeing and finishing plant can consume 9 gallons of water per yard of finished goods, basis 36 inch width. In between the water and the ink are other chemicals. In some way the salesman must find out why a textile plant no longer buys from anybody a certain chemical. Better still, he must try to foresee that unhappy event and prepare himself. To repeat, there is some lag. A careful reading of advertisements is a good approach to anticipation. The reading of good trade and technical journals is helpful, and the annual reports of the United States Tariff Commission entitled "Dyes and Other Synthetic Organic Chemicals in The United States" contain valuable clues. I know college professors who read technical advertisements in order to keep abreast of new ideas, and I know chemical salesmen who never look at the Commission's reports.

The Selling of a New Product

Now let us suppose you have a new product. Your much to be desired buyer has learned by experience not to expect miracles out of five pounds of laundry soap dissolved in a barrel of water, but at the same time he has no laboratory able to take the product apart or to try it out on a pilot plant scale. There are plenty of such textile buyers. He knows his processes fairly well, you may or may not. In the first place, you will give no warranty, and next, you do not crave the condition that your service man may not apply experience at this plant to another plant, and furthermore, you do not want to pursue the unhappy course of selling a patented use. Again, your product is good technically, but still you cannot foresee just how to fit it into the art of this textile manufacturer. It is my experience that it is harder to sell a new product than an old one. Human nature resists change with ease. On this occasion you are not selling the same motor car with square door knobs instead of knife handled ones. I have no sure answer to my own question, but I have a story. A few years ago a salesman for titanium dioxide called upon a tough minded purchaser of a large paper mill. The salesman offered a ton of his goods free of charge and delivered, and said, "This is my first call on the paper industry; my goods are the whitest white known to the lacquer and related industries, compatible with all the queer things that go into lacquer and with the greatest covering power; you have to use fillers for some grades of paper; perhaps this is a valuable filler." "What is the price," said the purchasing agent. The salesman named a price about four times that of good clay, but added, "I am not offering a substitute for clay, I am offering titanium dioxide." The offer was accepted; the goods were tried; the results were astoundingly fine and the price was intrinsically cheap. The purchasing agent told this story at a technical conference and made a plea for fair treatment of salesmen.

What About Consumer Service?

Time is wanting to discuss the servicing of textile industries and the integration of selling and service. It is obvious enough that service has been furnished the textile industry on an increasing scale in the past 20 years. To my knowledge the German dyestuff industry as early as 1910 would furnish a German Ph.D. to show the art of dyeing vat colors. The chlorine industry taught the art of sodium hypochlorite bleaching as early as 1910, and a few years later the peroxide manufacturers taught peroxide bleaching. Later still, the use of wetting out agents and new detergents was serviced to some extent, and the advent of resins, rubber compounds, etc., will doubtless produce still more servicing.

I am of the opinion that salesmen should know all they can about the goods they sell, even though there is service. The textile industry is not pursuing a science, it is practicing a minor art and has plenty of tradition. On the other hand, there are few chemists who provide a new product for a particular use. Chemists spawn products, but unlike fish do not guard the nest until the eggs are hatched. Some of the best uses of chemicals are sheer accidents. They remind you of the story always told about Edison. It is alleged that he always started a line of investigation with the first bottle on the left of the top shelf.

So, in conclusion, the chemist can provide a product and relate its physical constants and tell us what it is, and the salesman and the service man are those who sell the goods and make them work usefully and, we hope, profitably in an economic scheme that is not static and not likely to be static. If the salesman cannot pave the way for the service man, the service man cannot work. It remains for the salesman to be the ambassador—he represents his country; he studies the country to which he is sent.

Creating Industries, 1919-1939

Chemical Financing

By D. P. Morgan

The development of the chemical industry in the past two decades to the point where writers blithely refer to "The Chemical Age" has required tremendous expenditures for research, plants, and equipment. Where has the financing come from? Dr. D. P. Morgan, chemical economist with the well-known New York firm of Scudder, Stevens & Clark,* in a "soul-searching" study of the financial structures of hundreds of companies, concludes that except for the aggressiveness of managerial policy and the achievement of a greater average rate of expansion, the leading chemical companies seem to have nothing in common that distinguishes them as a group from other companies in other industries on a financial basis. He does add, however, that it is characteristic of the chemical industry to obtain funds for expansion from profits and depreciation reserves rather than from outside sources of financing.

DURING the last twenty years there has been much publicity regarding the financing of chemical enterprises. When the going was good the chemical companies received a generous share of the headlines about new issues of securities. From the ballyhoo of the market the impression was created that the industry practically owed its existence to this financing. As a matter of fact, however, this is far from the case, if the experience of the leading companies in the industry can be accepted as representative.

As will be seen later, it has been estimated that, during the last thirteen years, a group of thirteen leading chemical companies alone expended over $1,300,000,000 for new plant, equipment and working capital. Yet, of this immense sum only a net amount of about $400,000,000, or 30%, was raised by outside financing through the issuance of bonds and stocks. The balance, or approximately 70% of the funds required, was obtained from profits or other internal sources and not from Wall Street.

Aside from the sale of securities the ultimate source of funds within a company is its earning power, past or present. To measure the relative importance of the rôles played by earning power and by bond and stock issues in chemical financing was the purpose of this study.

The method of approach was to apply well-known investment accounting methods by which the information provided in Surplus and Income Accounts is reconciled with the changes occurring between successive years on Comparative Balance Sheets.[1] In this way it is a straightforward matter to prepare the familiar "Source and Disposition of Funds Statement" which is used generally in any thoroughgoing interpretation of financial statements. If this method of analyzing the flow of funds in a company is extended to cover a protracted series of years during which a considerable degree of expansion took place, then the aggregate total for the whole period provides an informative picture of a company's financial history.

Such a period of great expansion not only in the Chemical Industry but in most other industries as well was covered by the thirteen years from 1925 to 1937 inclusive. While it would have been more interesting to go back a few years further this proved to be impractical as an increasing proportion of interesting companies failed to report adequate figures at that time. In fact, for some of the most outstanding chemical companies it was even impossible to obtain adequate data back to 1925. Therefore, in order to complete our study, certain partially complete series of data had to be supplemented with estimates or with additional information very gratefully received from official sources. For this reason, the results leave much to be desired from the viewpoint of an auditor. Still it is felt that the general picture is sufficiently reliable for the purposes in hand.

On account of the time required to analyze individual Balance Sheets and Income Accounts our attention was limited to a comparatively small number of companies on which suitable financial information was available. For this purpose thirteen leading chemical companies were selected and, in addition, in order to bring out by comparison the special characteristics of the industry, about fifty typical companies or small groups of companies in other manufacturing industries were also studied.* Finally, the showings of certain financially unsuccessful companies were included to round out the picture.

In Chart I and Table I there are shown in percentages and dollars the Composite Source and Disposition Statements of the Chemical Industry for the thirteen-year period from 1925 to 1937 inclusive. Here it is seen that in this interval these thirteen companies spent an estimated $1,054,000,000 on plant expansion. At the same time, in order to handle the resultant larger volume of business, it was necessary to expand working capital by $260,000,000. In short, the total expansion of the business of these companies involved the expenditure of $1,314,000,000. The funds necessary to foot this immense bill were obtained from depreciation, from earnings retained for reinvestment in the business and from the sale of securities. The first of these sources provided $530,000,000. After payment of interest and dividends of $1,469,000,000, or roughly

* Grateful acknowledgment is made for assistance of colleagues in the Research Department of Scudder, Stevens & Clark.

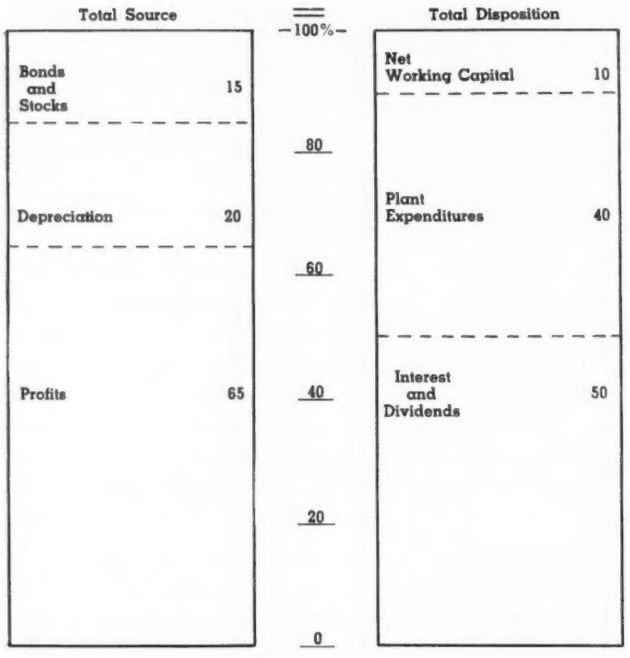
80% of total profits aggregating $1,856,000,000, there remained $387,000,000 from the second source. Taken together these two sources provided $917,000,000. The balance of $397,000,000, or 30.2%, was obtained by outside financing.

It is also interesting to note that profits and depreciation taken together, as operating sources of funds,

CHART I

CHEMICAL COMPANY COMPOSITE ★

SOURCE AND DISPOSITION OF FUNDS



supplied $2,386,000,000, or almost exactly six times as much money as the $397,000,000 figure, net, obtained from outside financing. This financing, incidentally, was almost all in the form of common stock of which the issues amounted to $358,000,000, or nearly nine times the $40,000,000 raised from preferreds, while there was actually a net retirement of $1,000,000 of bonds. As a matter of fact some $30,000,000 worth of bonds had been sold at one time or another but before the close of the period under examination $1,000,000

TABLE I*

Chemical Company Composite
Total Sources equal Total Dispositions of Funds
(13 years, 1925-1937 inclusive)

A. Sources

Net Profits	$1,856,000,000	66.7%
Depreciation	530,000,000	19.0%
Preferred Stock Sold (a)	40,000,000	1.4%
Common Stock Sold	358,000,000	12.9%
Total	$2,784,000,000	100.0%

B. Dispositions

New Net Working Capital (b)	$ 260,000,000	9.4%
Plant Expenditures (Est.)	1,054,000,000	37.9%
Bonds Retired (c)	1,000,000	.....
Interest and Dividends Paid	1,469,000,000	52.7%
Total	$2,784,000,000	100.0%

(a) Includes Debenture Stock. Also, this is the net amount as the total stock issued was $103,274,000, of which $64,041,000 was retired.

(b) Includes Other Assets and Liabilities, Net.

(c) Net Amount. Actually there were issued $29,725,000 of Bonds, while $30,536,000 were retired during the period under review.

* For lack of space the voluminous data underlying this study have not been submitted. Readers who are anxious to consult the original figures should communicate with the author. The chemical companies studied were: Air Reduction, Allied Chemical & Dye, American Cyanamid, Atlas Powder, Commercial Solvents, Dow, Du Pont, Eastman Kodak, Hercules Powder, Mathieson Alkali, Monsanto, Union Carbide & Carbon, and U. S. Industrial Alcohol.

Note on Limitations of Method

Since plant expenditures were seldom reported directly (especially in the chemical industry) the figures used in these charts were estimated in almost every instance. Where depreciation or retirements were available it was possible to estimate plant expenditures roughly from the changes in net plant, or in gross plant and depreciation reserves. When neither retirements nor depreciation were given throughout the entire thirteen-year period it was necessary to estimate them on the basis of such data as were available. Since the advent of the S. E. C. the larger listed companies have reported depreciation and these published figures served as a guide in the estimation of earlier years where such was necessary. Salvage on plant equipment retired, when it occurs, is not generally reported and was therefore neglected, so the estimates of plant expenditures are generally somewhat too low. However, judging from cases where complete information was available, the error introduced in this manner was seldom greater than 5% and even a 10% error would hardly be sufficient to throw off the general conclusions of this study.

In addition to the foregoing there are other limitations. In the earlier years when Government regulation was less strict conservative companies could write off inventories, plant, equipment, etc. from income. It is assumed here, however, that over-maintenance and over-depreciation, though much talked about in the late nineteen twenties, were probably less important than many people thought and were also compensated to a large extent by the reverse policies in subsequent bad years. Where statements were audited by outstanding firms it is presumptive that by and large the accounting methods were orthodox. To be sure, there have been exceptions but it is believed that the results of this study are satisfactory for our purposes, in spite of unavoidable errors introduced by these possible practices.

Finally, there is a possibility of distortion in the case of companies which expanded in a big way at the very beginning or end of the thirteen-year period. In such cases it is necessary to have a thorough familiarity with the changes in the underlying data year by year. In the present study the conclusions are of such a general nature that it was thought unnecessary to attempt to eliminate the effects of such unevenness.

This study relates only to long term financing and, for lack of adequate data, excludes current bank loans that may be made and paid off within the interval between publication of two successive financial statements. Short term bank loans carried over the fiscal year-end as current liabilities are reflected in this study. The net increase or decrease in such loans over the whole thirteen-year period is included in the computation of the net working capital. On the whole it is felt, for the manufacturing industries studied here, that the overall net change in the balance of bank loans carried over fiscal year-end statements was not important in relation to the other factors shown in this study.

more than their equivalent had been retired. Also, about $100,000,000 of preferred stock issues had been sold but of these issues $60,000,000 had been redeemed before the close of the period under review. While this great expansion was going on, the total Invested Capital of the thirteen companies increased by 74%, from $859,000,000 in 1925 to $1,494,000,000 in 1937.

As long as high earnings accompany the conservative depreciation and dividend policies in the Chemical Industry, important outside financing will only be necessary on those comparatively rare occasions when some exceptionally large new project is to be undertaken. While this is not particularly encouraging information to the financial community, the situation is not new. Nor is the outlook for current financing by short term bank loans any more favorable. For, while the cash requirements of the industry are great, the strong current position of most of the leading companies indicates a state of independence from the need of short term commercial banking facilities almost as great as the above mentioned freedom from need for long term financing through the issuance of bonds or preferred and common stocks.

This enviable position was made possible by the high return on initial investment. Had this return been less, as in the case of railroads or public utilities, rapid expansion might well have necessitated a greater dependence upon outside financing. In view of the considerable risks involved at the outset, however, it is doubtful if financing through senior obligations would have been suitable on a large scale for the initiation of most chemical enterprises. While some of the larger chemical companies have resorted to outside sources for capital in the last two or three years the issues were mainly preferred stocks and were small in relation to the total assets of the company.

Although the Chemical Composite is fairly representative of average experience in this industry it is a fact, as may be expected, that there are exceptions to the general rule of financial behavior. Relative to the Composite average, some companies for example were less enterprising throughout the period under review and therefore needed no outside financing. They paid out as dividends a greater proportion of earnings and made a comparatively smaller investment in new plant. In fact, several companies, like Allied Chemical & Dye, even retired bonds and preferred stock outstanding from earlier periods. Other more aggressive companies, however, reinvested more than 60% of total resources in new plant—far above the average—and obtained a considerable part of the necessary funds from the issuance of capital stock. Yet, in no single case did bond issues supply more than a small portion of the funds required.

Other Manufacturing Industries

Bearing in mind the chemical picture, it is interesting to see how it compares with corresponding results for other industries. To this end similar studies have been made of typical companies in many of the leading manufacturing industries. Although the limitations in availability of time and suitability of data eliminated a number of industries and companies, on the whole the results are considered representative.

With these limitations, the companies studied seem to fall into three groups which have been classified on the basis of the proportion of plant expenditures, as follows:

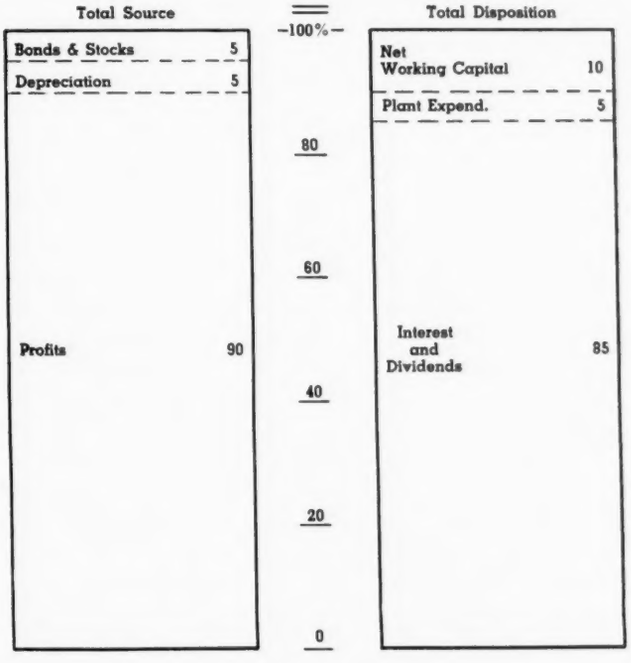
(A) Companies which got along throughout the entire thirteen-year period without spending any considerable sum on the renewal or expansion of plant and equipment. This group consists, for the most part, of consumption goods companies. In this field rapid expansion of capacity by seasoned companies is seldom necessary and, furthermore, depreciation on plant and equipment is a comparatively small factor relative to administrative, selling and advertising expenses, and net profits.

(B) Companies like the majority of manufacturing concerns which had to spend money on plant just to survive even though growth was slight. Even when not expanding capacity materially such companies must apply a significant proportion of available resources to the replacement and renewal of fully depreciated or obsolete plant and equipment. Well-managed concerns of this type, in industries where competition is not too

CHART II

Double Diagram

TYPE "A" COMPANIES★



★ *American Tobacco, Diamond Match, Lambert (12 years, 1926-1937), Liggett & Myers Tobacco, Parke-Davis, and Reynolds Tobacco.*

severe, can usually get along without the need for very much outside financing.

(C) Companies like the preceding except that they were undergoing a rapid and extensive renovation or expansion of operating capacity. Depending on the profitableness of the situations these companies will differ as to the degree of dependence on outside financing. Included in this group are those unfortunate enterprises where it turned out later that the program was unwise or even possibly fraudulent. Needless to say, the distinction between honest and dishonest management is seldom revealed till too late by balance sheet and income account figures alone.

To illustrate, there is submitted in Chart II a double diagram which roughly represents the average overall picture of the thirteen-year Sources and Dispositions of Funds of half a dozen leading Type "A" companies. As was stated above, these companies are mostly in consumption goods industries.

In this much condensed and somewhat over-simplified chart it is readily seen that the type "A" companies are different financially from those included in the Chemical Composite Chart. Evidently the main financial activity of these companies is to produce profits and pay dividends. Expenditures for new plant and equipment are negligible and are amply provided for out of the proportionately small depreciation charges. A not very large increase in the item Net Working Capital, which for simplicity includes the net balance of other assets and other liabilities, may be considered to have been derived in part from profits in excess of dividends while the remainder was obtained by outside financing.

It takes little knowledge of the characteristically high depreciation charges and typically large construction programs of the Chemical Industry to see that no chemical companies would fall in the Type "A" group.

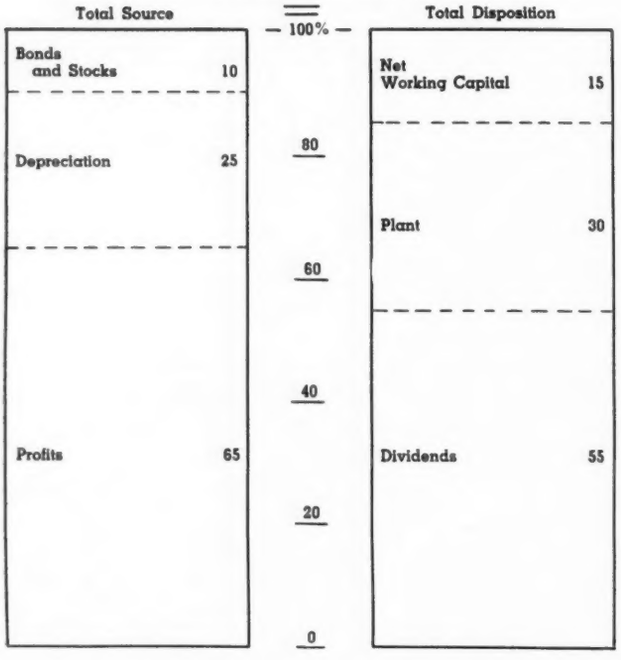
In Chart III, it is apparent, from the double diagram designed to represent the Type "B" companies, that depreciation and plant expenditures play a much more important rôle than was the case with the Type "A" companies. Outside financing and the change in net working capital are not much larger and, consequently, the greater proportion of funds applied to plant expenditure are derived largely from increased depreciation and at the expense of dividends.

Incidentally, it is to be noted that somewhat more capital has been raised through outside financing in Type "B" than in Type "A." Relative to depreciation and the retention of earnings after dividends, however, funds derived from sale of bond or stock issues are surprisingly small. If, as appears to be the case, this state of affairs is more or less characteristic of the major part of all manufacturing industry, it is apparent that the corporation president rather than the banker controls the larger portion of industry's capital expenditures.

CHART III

Double Diagram

TYPE "B" COMPANIES ★



* *Aluminum Company of America, American Can, Babcock & Wilcox, General Electric, General Motors, Ingersoll-Rand, B. F. Goodrich, International Nickel, Kennecott Copper, St. Joseph Lead, Sherwin-Williams, Swift, and U. S. Rubber.*

Few Chemical Companies in "B"

Only a few of the less enterprising chemical companies, by the way, fall into group "B." While it was comparatively easy to set up a truly representative double diagram for group "A," the degree of variation among the companies in group "B" was greater and therefore the diagram, which was prepared by inspection of the underlying data as before, is considerably less representative. Thus, from the point of view of plant expansion, which is placed at 30% in the Type "B" composite, there were some companies as low as 20% and others as high as 40%.

Exceptions In Two Ways

While the double diagram in Chart IV roughly represents a number of the rapidly expanding companies in group "C," important exceptions occur in two ways.

Firstly, certain of the more aggressive companies in this group, in the headlong rush to renovate or expand on a large scale, have obtained the necessary funds to a much greater extent from bond and stock issues than was indicated in the Composite. For example, International Combustion Engineering, as an extreme case, obtained only about 15% of its funds from profits and 10% from depreciation, the remaining 75% coming from the sale of bonds and stock. The disposition of the company's funds, however, was in almost exactly the proportions indicated in the double diagram.

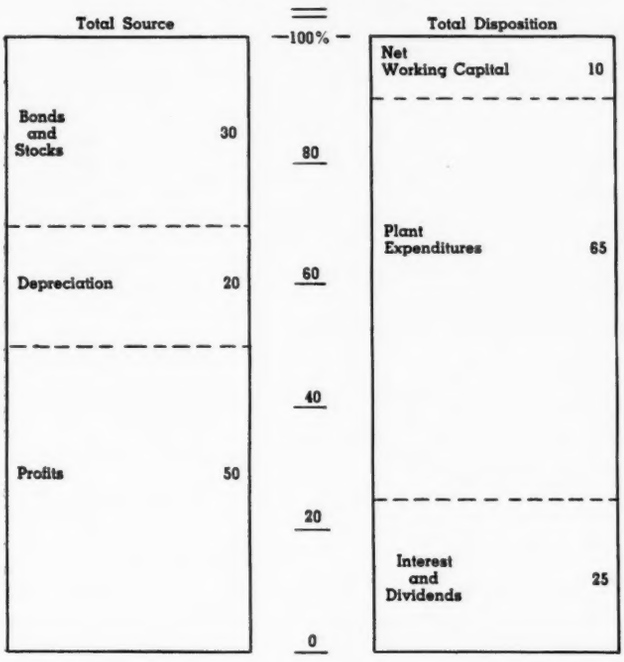
Secondly, although most of the group "C" companies spent the major portion of their available funds

on new plant and equipment, there were several that acquired other assets on a large scale. Mr. Kreuger of International Match, for instance, put less than

CHART IV

Double Diagram

TYPE "C" COMPANIES★



* *Chrysler, Coty, Climax Molybdenum (6 years, 1932-1937), Goodyear Tire & Rubber, Industrial Rayon, International Combustion Engineering (7 years, 1925-1931), International Match (6 years, 1925-1930), Libbey-Owens-Ford, Lone Star Cement, McKesson & Robbins (9 years, 1929-1937), National Distillers Products, Petroleum Refiners (Composite of 14 companies), Schenley Distillers (6 years, 1933-1938), Steels (Composite of 8 companies), U. S. Gypsum and Public Utilities (Composite).*

10% of his company's funds into plant and most of the balance, after a small proportion of dividends, reputedly went into the purchase of foreign concessions. Similarly, Mr. Coster-Musica apparently[2] covered up the non-existence of approximately $20,000,000 of his company's funds by inflating accounts receivable and inventories.

Part Business Risks Play

At first glance it is a shock to find that the most aggressive and successful chemical companies, from the standpoint of reported balance sheet changes, are not more readily distinguished from less successful concerns. The reason, however, is readily comprehended on a moment's thought. For, regardless of what stockholders may think, Balance Sheets and Income Accounts only record past history. Auditors do not appraise the business risks in view of possible future developments. Nor do they pass judgment on the scientific or engineering aspects of a new project. Accordingly, the last Balance Sheet of what may soon be known as an unwise or even dishonest venture merely records that so much more money has been spent on such and such items of plant, equipment, supplies, etcetera. The very existence of many items is seldom checked by the auditor in view of the great expense involved in such a procedure. Even if he did check the existence of each asset the question is raised whether or not he would be competent to pass on its utility. Witness, for example, the phenomenon of an antiquated plant operating at full capacity alongside of a spick and span but idle model of perfection in the same industry.

Question of Proper Audit

This is not the time or place, however, to enter into a discussion of methods of appraising company prospects from an investment viewpoint. Yet, it is appropriate to wonder whether or not it could be made a great deal more difficult to engulf the public in a real high grade hoax if, in addition to the ordinary accounting auditor, companies were required to show their plants and stocks of raw materials and finished goods to at least one outsider selected by the stockholders, or by the independent auditors, for his integrity and general knowledge of the industry. To be sure, a complete engineering survey and appraisal of the enterprise would be too costly. Still, a common sense, or technical, audit, carried out along the lines indicated above, could be made on a more reasonable basis, and, on occasion, might well save a lot of money for many people even including corporate directors.

Summary

In review, application has been made of a well-known accounting method, the Source and Disposition of Funds Statement, to compare the financial activities of a number of leading chemical and other manufacturing concerns.

On the basis of their estimated plant expenditures the broadly divergent companies in different industries were classified into three types, "A," "B" and "C." Type "A" includes consumption goods industries which spent relatively little on new plant and equipment. None of the chemical companies studied fall in this group. Type "B" consists of companies that were not expanding rapidly but still spent a fair amount on renewals and replacements of worn-out or obsolete plant and equipment. A few of the less enterprising chemical companies are in line with type "B". The more aggressive chemical companies exhibit financial characteristics similar to Type "C," composed of companies that were undergoing a rapid and extensive renovation of plant and other operating facilities.

Since the financial statements on which this work was based merely reflect the past record, no definite indication is given as to whether or not said expansion was well advised. In consequence, it is not surprising to find that, judging by their double diagrams, some of the most successful chemical companies fall in the same class as certain equally aggressive but less successful industrial enterprises.

ADVERTISING PAGES REMOVED

Except for the aggressiveness of managerial policy and the achievement of a greater average rate of expansion, the leading chemical companies seem to have nothing in common that distinguishes them as a group from other companies in other industries on a financial basis. To be sure, it is a characteristic of the Chemical Industry to obtain the funds required for expansion from profits and depreciation reserves rather than from outside financing. Yet it has been seen that other manufacturing concerns exhibit the same behavior.

Judging from the field covered in this study, the degree of reliance upon profits and depreciation reserves for purposes of expansion is not so much a trait of a particular industry as it is a factor that is determined by the rapidity of expansion, the proportionate amount of capital required and the anticipated return on the proposed new investment. In short, then, the generally high rate of return on new increments of capital invested in plant and equipment has been a deciding factor in determining the characteristics of Chemical Financing.

(1) Finney, H. A., Principles of Accounting, Vol. I, Chapter 25, Prentiss-Hall, New York, 1928.

(2) "Report and Summary of the Operations of the Business of McKesson & Robbins, Inc., Debtor, and of the Present Condition Thereof," William J. Wardall, Trustee, January 27, 1939.

Temperature Indicating Paints

By W. G. Cass

USE of certain kinds of paint for indicating temperature changes, and more particularly to provide visual indication or timely warning of a rise in temperature which might be undesirable and dangerous has been known for many years and they have chiefly been used for machinery bearings and in similar cases where unwanted heating might occur, especially at inaccessible points, and the heating has been shown by a change in color of the paint. Its extent or intensity would depend roughly on the degree of color change. These paints have not been described to any extent in the technical literature: the principal reference in English is a short article by Pinnock in the *Review Section of the Jour. Soc. Chem. Ind.* (England), Vol. 38, 1919, page 78, wherein various metallic pigments are described, including the double salts—mercury-silver iodide; and various compounds of arsenic, antimony, and lead may also be used.

These preparations, however, could only be applied in cases of relatively low temperature, not exceeding about 80° C., and the color change was not usually very sharply defined, nor was it permanent, so that their use was comparatively limited.

There are many places where the method of indicating temperature changes and distribution by means of paints would be extremely valuable if they could only be applicable for high temperatures, and, more important still, if the color changes were very definite, sharply defined, and permanent. The I.G. has, during the past year or two, undertaken a vast amount of research in order to discover suitable preparations, more particularly in connection with aircraft engine and fuel investigation. In testing the efficacy of various fuels of air-cooling devices, and for other like purposes it has been necessary to study temperature changes and distribution in cylinders and other parts of aircraft engines very thoroughly.

This has been done hitherto by the rather laborious and unsatisfactory method of taking several temperature measurements, by means of thermo-elements in various parts of the cylinder, in order to test the effect of varying forms and position of aircooling baffles and conduits, and for other purposes. After prolonged research it has at length been possible to prepare paints which conform to very exacting requirements. That is to say, the color change in the paint takes place at a certain fairly definite temperature, according to the pigment used; the change is permanent, with one or two trifling exceptions noted below, and does not revert on cooling; and the change is quite marked and definite without fear of doubt or confusion. The paints have been thoroughly tried out by the I.G.'s Oils Department at Oppau, under the direction of Herr Fritz Penzig who has been good enough to furnish information to the present writer, including intimation of the fact that additional colors have recently been added to the range, suitable for use up to temperatures of 650°. Out of the 300 or more thermo-colors investigated, including many entirely new compounds, and consisting mainly of complex metal salts, the following have been found suitable for the purpose immediately intended; but there is little doubt that these thermo-colors will find many other important fields of usefulness, e.g. in electric heating apparatus and indeed in every case where temperature change and distribution may with advantage be visually indicated in this way:

No.	*Color-Change*	*Temp. ° C.*
1	Rose to blue	30
2	Light green to blue	60
3	Light yellow to violet	110
4	Purple to blue	140
5	White to greenish-brown	175
6	Green to dark brown	220
7	Yellow to reddish brown	290
8	White to light brown	340
9	Violet to white	440
11	Light blue to violet	580
12	Olive green to light green	650
20	Light rose (pink) to light blue	65
	Light blue to light brown	145
30	Light green to light blue	65
	Light blue to olive green	145
	Olive green to grey-brown	220
31	Brown to grey-brown	155
	Grey-brown to green-brown	230
	Green-brown to red-brown	275

Paints Nos. 1, 2, and 3, tend to revert to their original color if used under moist conditions, but in all other cases the color change is permanent on cooling. Nos. 11 and 12 for the highest temperatures have only recently been added, and should have a wide field of usefulness for special purposes, some of which are now being tested in Germany, including light metal treatment.

An important part of the preliminary work was the choice of a suitable binding agent. This was ultimately found in a synthetic resin soluble in alcohol, giving a very quick drying paint—an essential desideratum in most cases. In use the pigment in powder form is mixed with the resin powder and sufficient alcohol added to make a product of the right consistency for application either by brush or spraying.

Although little information is yet available as to the exact composition of the pigments—which are the subject of patent applications in Germany and other countries—the writer has been told that they are, for the most part, salts of various metals, such as copper, nickel, cobalt, cadmium, uranium, etc.

"Headliners"

Newly Appointed: Daniel B. Curll, Jr., formerly chemist with Philadelphia Quartz, who has been appointed assistant to A. E. Marshall, president, Rumford Chemical Works.

Honors: Frances M. Suarez, manager, Advertising Department, Philadelphia Quartz, and member of the Philadelphia Club of Advertising Women, who was presented, at the 35th Convention of Advertising Federation of America, with a certificate of merit in the Josephine Snapp Advertising Competition for Women, in recognition of her contribution to advertising in '38.

Promotion: Arthur Langmeier who was recently named director of operations of Hercules' Naval Stores Department.

Board Member: Walter F. Perkins, vice-president of Koppers Company in charge of its Baltimore operations, who has been elected a member of the board of directors of Koppers Company.

Relaxation: Members of the Chemists' Club (N.Y.) at Wingfoot June 8. Host Charles Hardy, president, Charles Hardy, Inc., third from the left at the head table, fifth from the left "Tommy" Thompson, Mathieson, new chairman of the golf committee, and next to him "Bob" Quinn, Mathieson, retiring chairman who was presented with a gift in appreciation of his past efforts. Other pictures on page 38.

Chemical Leaders at the Skytop Meeting of the M. C. A.

Dr. C. A. Thomas, director of research, Monsanto Chemical, H. L. Derby, president, American Cyanamid & Chemical, and O. C. Ingraham, president, General Chemical, lend attentive ears to Charles F. Kettering, General Motors, as the latter emphasizes a point. Dr. Kettering's address on radiation chemistry was one of the highlights of the meeting. At the extreme right is "Charlie" Mace, secretary of the S.O.C.M.A.

Above "Cy" (W. I.) Galliher, vice-president and director of sales, Columbia Alkali; George Lee Camp, Monsanto director of sales and vice-president.

Below, H. W. Fisher and James G. Park, both vice-presidents, Standard Alcohol, "report" to the president of the company, Dr. M. B. Hopkins.

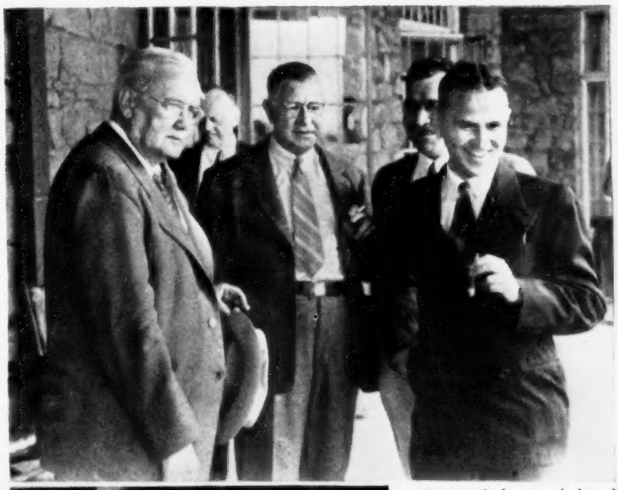
Below, Dr. E. H Killheffer, DuPont.

Reading left to right, Fred A. Neuberg, vice-president and sales manager, Warner Chemical; A. J. Royce, president, Royce Chemical; "Bob" Wilkins, Hooker Electrochemical, and "Bill" George, CHEMICAL INDUSTRIES, and S. W. Jacobs, vice-president, Electro-Bleaching Gas.

Busily watching the golfers are: T. S. Grasselli, a director and vice-president of DuPont, Dr. R. N. Wallach, chairman of the board, Sylvania Industrial Corp., E. W. Furst, general manager, Grasselli Chemicals Department of DuPont, and Dr. F. H. Reichel, president, Sylvania Industrial. At the right is Stanley Weil, vice-president, Natural Products Refining. Stanley refuses to disclose who he was giving the "bird" to.

June is traditionally the month of conventions and golf tournaments. On these and subsequent pages we present "candid camera" shots from the Manufacturing Chemists' Association, Chemists' Club (N. Y.), and Chemical Salesmen's gatherings.

M.C.A. members gathering on the "South Porch" for a group picture. Directly in the center is William B. Bell, president, American Cyanamid; at the extreme right directly below R. W. Hooker (in the white suit) is the retiring M.C.A. president, E. M. Allen, president, Mathieson Alkali.



Below, C. C. Concannon, chief, chemical division, U. S. Bureau of Foreign and Domestic Commerce, and Williams Haynes, editorial director of "C. I.," seem to be engrossed in some very weighty matter. To the right, George W. Simon, vice-president, Heyden Chemical, looking over the weather.

Above, left to right, William A. Harshaw, chairman of the board, Harshaw Chemical, Albert A. Teeter, treasurer, Chas. Pfizer & Co., John L. Smith, vice-president, Chas. Pfizer & Co., and Hans Stauffer.

Above, left to right, R. W. Hooker, sales manager, Hooker Electrochemical, J. R. M. Klotz, Stanco Distributors, Inc., and George A. Bennington, vice-president in charge of sales, Mutual Chemical.

Above, Charles L. Gabriel, vice-president, Commercial Solvents, and Warren N. Watson, M.C.A. secretary; to the right "Arch" (A. L.) Geisinger, manager, Standard Silicate Division, Diamond Alkali.

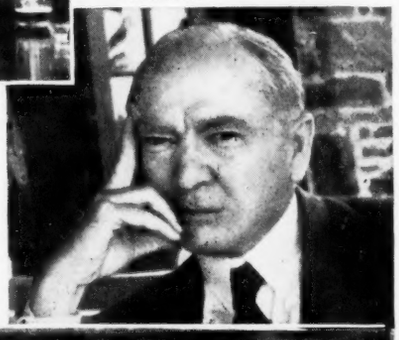
Left, Kenneth H. Klipstein, manager of the Calco Chemical Development Department, right, J. E. Bonnabeau, sales manager, agency division, Barrett, Edward S. Davis, secretary and manager, Detroit Chemical Works, and H. A. Goman, president, Natural Products Refining.

Chemists' Club at Wingfoot

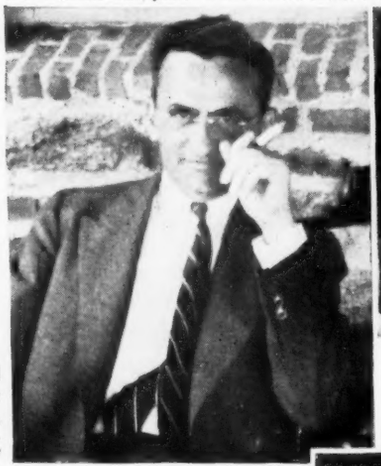
At the right, J. H. Karrh, Victor Chemical (2nd low net), and George Taylor, American Cyanamid & Chemical.

Above, left to right, Gerald Furman, Merck (2nd low gross), "Jack" Remensyder, Heyden Chemical and Dr. John Wright, Vicks Chemical; directly below, H. B. Bishop, president, Sterling Products.

Above, A. M. Taylor, consultant; at the left, Ralph Buck, DuPont; at the right, Dr. C. R. Downs, Weiss & Downs, and Nelson Littell, patent attorney; at the left, "Bill" Weed, Electro Bleaching Gas, and George Bode, R. & H. Chemicals Division of DuPont; "Charlie" Douglas of Diamond Alkali (directly below Weed and Bode) appears to be enjoying the "festivities."



Directly below, Henry Stiller, Advance Solvents & Chemical; to the right, "Wallie" Merrill, Joseph Turner & Co., and winner of both the Chemical Salesmen's Trophy and the President's Trophy, tells "Doc" Dorland, Dow Chemical, just how it's done with mirrors.



Below, "Harold" (N. H.) Fyffe, Oldbury Electrochemical, appears to be having difficulty convincing "Bob" Quinn (Mathieson Alkali) and Howard Farkas (U. S. Stoneware) that he really won the Peddler's Trophy.

Below, gathered around the "festive board," left to right, E. L. Luaces, consultant, Dr. "Joe" Ebert, Farastan Co., "Dave" Jackson, Croll-Reynolds Co., Roger Komstoff, consultant, "Bill" Brewer, Calco, and E. A. Van Valkenburgh, consultant.

Plant Operation and Management

A digest of new methods and plant equipment

An Evaluation of Some of the Corrosion-Resistant Materials of Construction

J. M. W. Chamberlain, manager of the engineering division of U. S. Stoneware Co., reviews the salient corrosion-resistant features of chemical stoneware, glass-lined equipment, synthetic rubber and natural rubber linings, and certain of the metals and alloys. In a future issue he will continue the review of other materials of construction of importance in combating corrosion.

IT is obvious that there can be no set classification of materials or constructions used in the fabrication of corrosion-resistant equipment. We can hope for little more in these few pages than a general outline covering the qualifications of several well-known classes of materials, and their methods of application. It is hoped, however, that the information contained herein will be valuable in eliminating the consideration of totally unsuited products and that it will enable designers to submit their problems more intelligently to the suppliers of those materials which are most likely to meet their requirements.

Possible materials for the construction of corrosion-resistant vessels are divided into two groups. The division point, in terms of size, is approximately 500 gallons. Below this capacity, equipment may be fabricated from practically all the corrosion-resistant materials, except glass, which is not obtainable in one-piece construction for capacities much in excess of forty (40) gallons. In the capacity range up to 500 gallons price, mechanical suitability, and personal preference play a strong part in selecting the material to be used. Above 500 gallons it is generally necessary to find a design that is capable of fabrication to meet both physical and corrosion-resistant requirements. In very large equipment, initial price frequently has to be the last consideration.

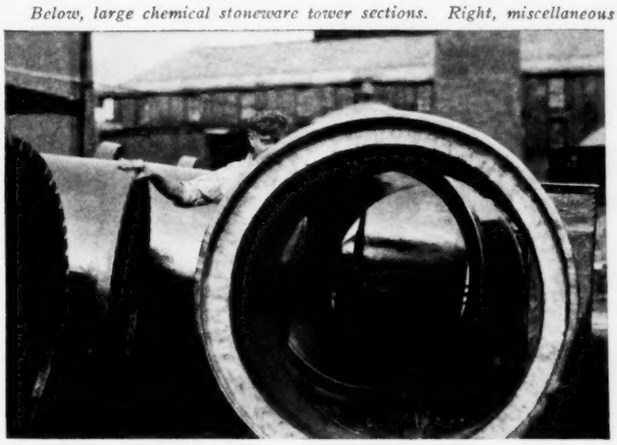
In small equipment, if one considers only corrosion-resistance, the choice of material is comparatively easy. For acid services, chemical glassware is without equal, but cost, mechanical strength, and ability to fabricate to unusual sizes and shapes frequently suggest the substitution of chemical stoneware. For vessels holding twenty-five (25) gallons or more, stoneware, which has corrosion-resistance practically equal to high grade glass, offers superior strength at much lower cost. Both glass and stoneware lack the ruggedness of steel equipment. Chemical stoneware, however, suffers the same fabrication restrictions as glass, when sizes must exceed 500 gallons. Glass enamel lined equipment, while not quite possessing the corrosion-resistance of chemical glassware, is capable of extending the general advantages of both glass and stoneware to vessels of several thousand gallons capacity. Rubber, synthetic rubber, and synthetic resin-lined equipment further extend vessel capacities to any size required. The corrosion-resistance of these last three lining materials is not as broad in scope as chemical stoneware or glass-lined equipment, but an increase in ruggedness and flexibility of design frequently suggest their use.

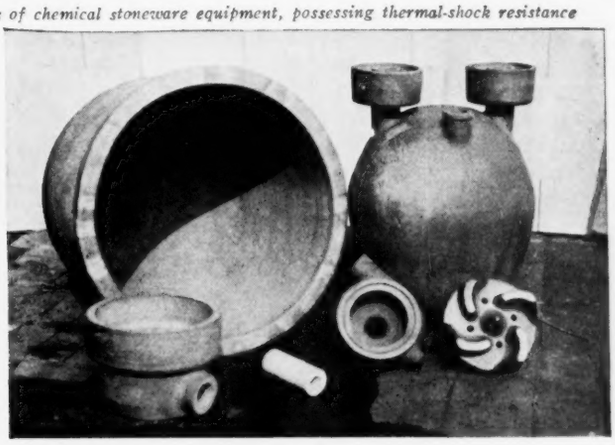
Many metal alloys and some metals are available that have excellent resistance to attack from certain groups of corrosive agents, but they must be very carefully selected for the job at hand. An alloy can seldom be specified unless it has been tested for the exact commercial solution to be handled, as extremely small percentages of foreign materials may cause rapid deterioration. For example: some alloys are resistant to certain acids when they are free from air, while the same acids, when aerated, attack the alloy rapidly. The structural strength and ruggedness of alloy equipment, its ability to operate at elevated temperatures, and its resistance to thermal shock, frequently dictate its use, in spite of relatively high initial cost. While some alloys, such as high-silica irons are limited in respect to the type of equipment that may be fabricated from them, many others impose no size restrictions.

More detailed discussion of the several material classifications and their physical properties are given in the following paragraphs.

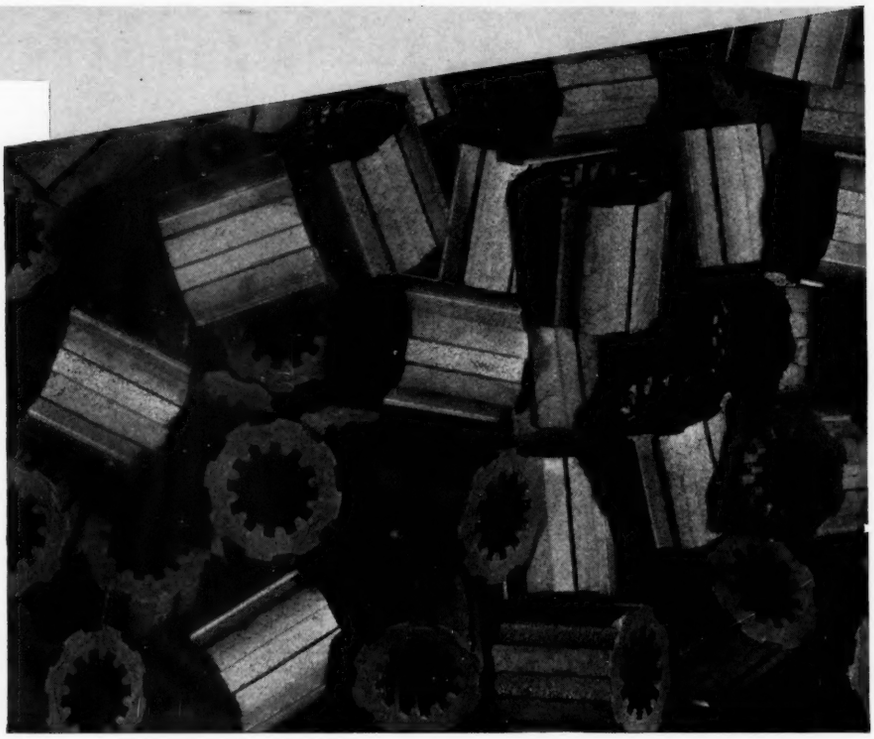
Chemical stoneware was the first material used to handle commercial quantities of corrosive substances in the chemical

Below, large chemical stoneware tower sections. Right, miscellaneous items of chemical stoneware equipment, possessing thermal-shock resistance





INCREASED EFFICIENCY IN TOWER PACKING



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Now available in the popular one inch size

Approximately 25% More Absorption Surface than in a plain 1 inch ring.

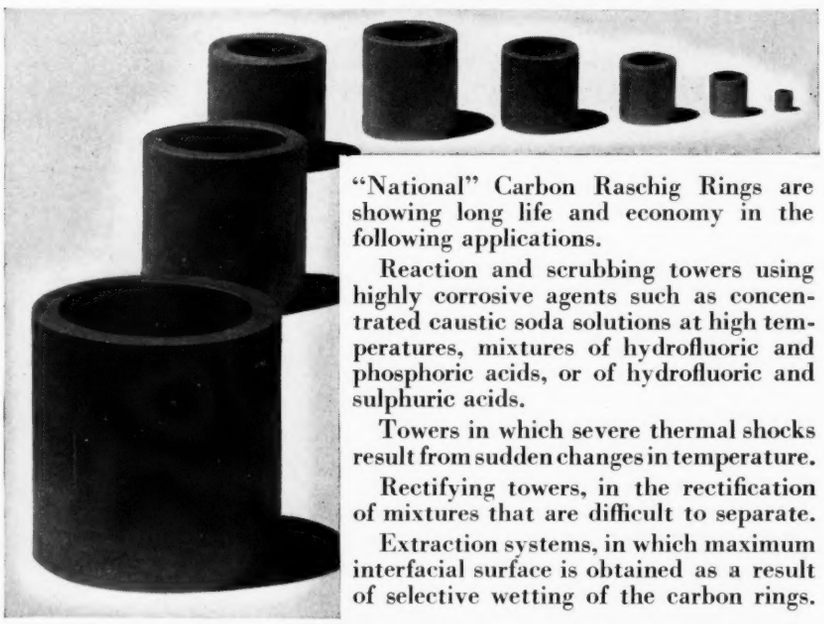
These new splined Raschig rings are particularly advantageous for use in comparatively dry towers.

In addition to the splined Raschig rings there are eight standard stock sizes of smooth rings as follows:
¼″ ½″ ¾″ 1″ 1¼″ 1½″ 2″ and 3″

"National" Carbon Raschig Rings are all carbon. They contain no soluble bond. They have the advantages of light weight, exceptional strength, high resistance to thermal shock, and long life in the presence of highly corrosive agents.

Surface texture insures complete wetting of the entire ring surface.

● "National" Carbon Raschig Rings are identified also by the trade-mark "Kempruf"



"National" Carbon Raschig Rings are showing long life and economy in the following applications.

Reaction and scrubbing towers using highly corrosive agents such as concentrated caustic soda solutions at high temperatures, mixtures of hydrofluoric and phosphoric acids, or of hydrofluoric and sulphuric acids.

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industry. It is a strong ceramic material, the physical properties of which can be varied over a wide range by modifying the body composition. Its resistance to attack by corrosive materials is only equalled by high grade chemical glassware. Hydrofluoric acid or its compounds attack stoneware, as do hot concentrated alkalies. The material is relatively inexpensive, even when fabricated in special shapes. One-piece vessels holding more than 500 gallons can be fabricated, but are not considered practical in service.

Chemical stoneware, while having a high compression strength, is rather easily cracked by impact shocks or sudden, violent temperature changes. Proper design and use minimize the danger of mechanical breakage, and some of the new high conductivity bodies minimize the danger of thermal failure. Many standard sizes and shapes are available in containers ranging from one to 500 gallon capacity.

While some chemical stoneware bodies are non-absorbent, an unglazed surface is hard to clean. Chemical stoneware can be given a surface glaze which facilitates cleaning.

Chemical stoneware tanks should be heated and cooled slowly, and must not be heated by direct exposure to an open flame. Heating is accomplished by liquid jacketing or internal coils.

Due to the nature of the material and the very high temperatures to which it is fired, there is some tendency toward warpage and dimensional inaccuracy. Tolerances of plus or minus 2% are an acceptable commercial standard. Exact dimensions may be obtained by machine grinding of the fired product.

Complete accessory equipment is available for use with stoneware vessels. Such accessories include pipe, valves, pumps, fans, and so forth.

The physical properties of stoneware can be made to vary over very wide ranges and the manufacturers should be given complete details regarding the use to which the stoneware article will be put. This information should include temperature variations, materials to be handled, and physical loadings. Below is a table giving the range of physical properties available in different bodies. It is impossible to achieve maximum properties in each category for any one body. For example, maximum resistance to thermal shock cannot be accompanied with minimum porosity and maximum compressive strength.

Compressive Strength (Lbs. per sq. in.)	Minimum	8,000
	Normal	25,000
	Maximum	75,000
Tensile Strength (Lbs. per sq. in.)	Minimum	800
	Normal	1,500
	Maximum	1,800
Modulus of Rupture (Lbs. per sq. in.)	Minimum	1,500
	Normal	5,000
	Maximum	8,000
Linear Co-Efficient of Expansion	Minimum	0.15×10^{-6}
	Normal	2.0×10^{-6}
	Maximum	4.0×10^{-6}
Porosity	Minimum	3 %
	Normal	10%
	Maximum	20%
Thermal Conductivity (per sq. in., per sq. ft., per hr., per ° F.)	Minimum	4.0
	Normal	8.5
	Maximum	42.0

A chemical analysis of an average chemical stoneware body is as follows:

Silica (SiO_2)	73.20%
Alumina (Al_2O_3)	22.35%
Iron (Fe_2O_3)	.65%
Magnesia (MgO)	.34%
Lime (CaO)	.01%
Alkalies and undetermined	2.95%

Glass-lined Equipment

Glass-lined equipment is fabricated by using special grades of fritted glass which are sprayed onto the surfaces to be covered. After spray coating, the articles are placed in an enamel furnace and the frit fused into a continuous mass, well bonded to the steel which it covers. The process of glass lining is, in reality, a refined porcelain enameling. The enamel frits used for glass linings are compounded to have the maximum possible corrosion resistance and an elastic behavior which will permit the glass coverings to follow the expansion and contraction of the metal on which it is placed.

Glass-lined equipment is easily kept clean, for its surface is non-porous and smooth. Open and closed vessels, process equipment, and storage tanks can be glass-lined. Glass-lined pipe is also available for use with this equipment. The size of vessels which can be lined with glass is limited by the capacity of the enameling furnaces. Glass-lined equipment extends the general advantages of regular laboratory glassware to vessels of 5,000 gallons capacity. A successful glass lining requires special design of the metal structures to be covered. Metal parts must be heavy enough that they do not warp in the enameling furnace. Expansion and contraction behavior of all the component parts to be covered, must be fairly uniform to prevent cracking of the glass lining. Glass-lined equipment can be subjected to reasonable thermal shocks in the range of zero to 650° F.

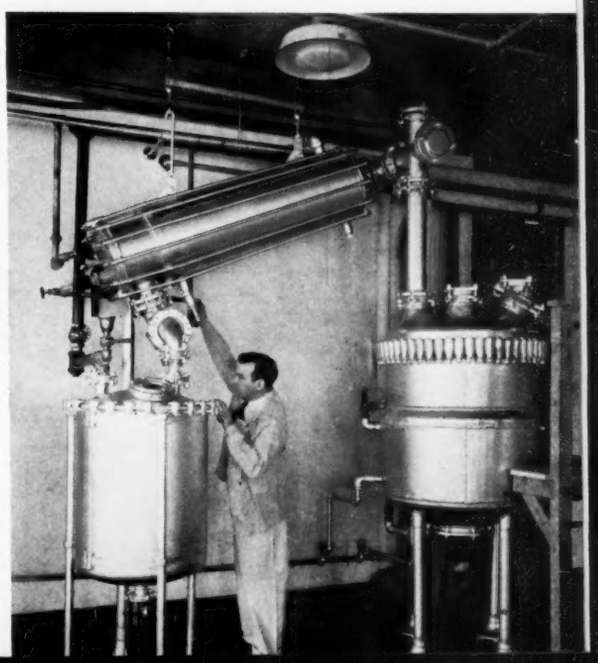
In heating or cooling glass-lined equipment, it is important that the heat transfer be as uniform as possible over the entire glass-lined surface, and this is most readily accomplished by jacketing the equipment. Open flames should never be directly applied. The heating medium should be under quick and positive control. With properly jacketed equipment, temperatures up to 600° F. are readily attainable.

Glass-lined equipment does not contain lead, tin, or oxides of arsenic, and is, therefore, non-poisonous, and may be used to handle many pharmaceutical and food products. Glass-lined equipment resists nitric, sulfuric, hydrochloric, cold phosphoric, hydriodic, aqua regia, inorganic acids, and their mixtures. Solvents and hydrocarbons do not affect glass-lined equipment, and it resists the action of the metallic chlorides. Glass coverings are attacked by hydrofluoric acid and salts of this acid. It is also attacked by hot caustics or hot concentrated phosphoric acid. It is slightly attacked by hot milk of lime, cyanides, and salts of similar character.

Glass-lined equipment can be damaged by mechanical impact and linings once chipped off cannot be restored to their original form, unless the whole vessel is returned to the factory and re-enameled. Considerable care is, therefore, essential in setting up and handling glass-lined equipment.

Synthetic Rubber and Natural Rubber Linings

Steel covered with a protective lining of either synthetic or natural rubber has become one of the most valuable types of construction for handling acids, alkalies, and other corrosive substances. Great design flexibility is possible in equipment of



A complete glass-lined distillation assembly for handling a delicate organic solution.

Rubber-lined steel pipe joined with a special type of patented flexible joint for handling spent pickle liquors.

this type. There are no limitations on size. Coverings may be applied to vessels ranging in capacity from one pint to 100,000 gallons. All of the structural advantages of steel fabrication are at the disposal of engineers designing rubber-lined, corrosion-resistant vessels, pipe, and process equipment.

Originally, rubber-lined equipment was limited in size to those shapes which could be placed in available vulcanizers. The early compounds were extremely limited in their ability to resist corrosion, and in general, had poor adhesion to metal surfaces. Great strides have been made by improving rubber compounds to resist an ever increasing variety of corrosive substances.

The methods of adhering rubber to steel have been improved to the point where adhesion difficulties are practically a problem of the past. Certain rubber linings applied by the Vulcalock process to steel have proven the utility of natural rubber linings in many fields.

Limiting Factor of Temperature

A limiting factor in all rubber-lined equipment is temperature. For use above 150° F., rubber linings, both natural and synthetic, are still in the experimental stage. Mechanical means have been devised to protect the linings at temperatures in the range of 150° F. to 225° F. From 225° F. down, a wide background of experience has been built up which proves the value of these linings for many services.

Rubber-lined steel equipment, today, is frequently given first consideration when corrosion-resistant equipment is to be fabricated. The low relative cost of rubber-lined steel construction, combined with the inherent strength of the outer steel structure, plus the general chemical inertia displayed by rubber compounds, permits the solution of practically all corrosive problems at normal, or relatively low temperatures. The few substances which attack natural rubber linings can now be readily handled by a new adaptation of one of the so-called synthetics of rubber-like nature.

Natural rubber linings are swollen and deteriorated—in varying degree, depending upon the material and the nature of the rubber compound—by nearly all drying oils, liquid fatty acids, cyclic aliphatic liquids, aromatic solvents, and hydrocarbons. Most severe are the effects of such solvents as carbontetrachloride, carbon bisulfide (the most destructive of all), benzine, and ethylene dichloride. Natural rubber compounds are also attacked by nitric acid, concentrated sulfuric acid, the dry halogens, and chromic acid. Mineral oils and greases have less effect on the true hard or semi-flexible hard rubber compounds than on the softer grades.

Until the introduction of satisfactory synthetic rubber-lined equipment, it was impossible to handle oxidizing agents, such as concentrated sulfuric and nitric acid in this type of equipment. The remarkable strides made with synthetic linings now permit the lining of tanks which are almost universal in their resistance to corrosion. A grade of synthetic rubber lining is now available which is not affected by acids or alkalies (provided the temperature of the lining does not exceed 150° F.), except Glacial acetic. This new grade of synthetic rubber also has remarkable resistance to solvents and hydrocarbons, in general being attacked only by the chlorinated solvents, gas distillate products, and creosote. As yet, the synthetic lining materials are not suitable for use with high concentrations of caustic. The availability of synthetic linings at prices competitive to natural rubber assure a tremendous field of application for this new material of construction.

Types of Rubber Linings

Natural rubber linings fall in five classes: Unvulcanized pale crepe, soft vulcanized, hard vulcanized, a combination of soft and hard types, and latex linings.

The unvulcanized pale crepe type is now used to a very limited extent for corrosion-resistant linings in chemical storage work, process or transportation equipment, the bulk of rubber linings now applied being of the vulcanized type.

The soft vulcanized linings are better capable of following the expansion and contraction of the steel on which they are placed than the hard vulcanized grades. Soft vulcanized rubbers, however, do not possess the degree of inertness to either corrosive attack, or oil and grease absorption exhibited by hard rubber. For handling many substances, however, the soft rubber is perfectly satisfactory, and is not readily damaged by mechanical impacts.

Triple Rubber Linings

The advantages of both the hard and soft rubber linings have been combined to form a triple rubber lining. These triple-effect linings consist of a soft layer bonded to the steel, a hard second layer, and a soft outer, or third layer. This construction permits the absorption of differential expansion and contraction by the hard rubber and the steel shell and at the same time, retains the maximum corrosion resistance exhibited by the hard rubber. This novel construction overcomes failures due to mechanical impacts or exposure to low temperatures. The triple-effect joints used with this type of construction take up the differential expansion and contraction of the center hard rubber layers. This construction, combined with the Vulcalock process of adhesion have undoubtedly been dominating influences in making rubber linings commercially practical.

Latex type linings which are applied by spraying, painting or dipping the steel to be covered in a solution of compounded rubber latex, can be advantageously used for some work. For certain types of articles having irregular contours, the latex method of applying rubber is more economical. Latex coverings, after vulcanization, may fall in either the category of soft or hard vulcanized. Some synthetic rubber latex lining work has been done, but as yet, has not found extensive commercial application. Latex linings in general suffer several restrictions. Rubber deposited from latex dispersions, even after vulcanization, is more susceptible to absorption of water, oil, or other liquids, than rubber which has been prepared in the form of calendered sheets subsequently applied. It is also impossible, with latex rubbers, to build up composite soft and hard rubber membranes of the triple-effect rubber type.

The new plasticized synthetic resin linings of the modified halide polymer type are now available at price competitive with rubber linings, and possess, in a large degree, the mechanical advantage displayed by the best natural rubber linings, plus an even wider range of inertia to attack by corrosive substances.

Equipment lined with synthetic rubber like materials give great promise of replacing much of the tank and pipe equipment now used for handling corrosive materials.

Partial List of Chemicals Handled by Linings of the Modified Halide Polymer Type.

All organic acids, except fuming nitric	Satisfactory
Alkali Solutions	Satisfactory
Alcohol (both pure & denatures)	Satisfactory
Petroleum Oils	Satisfactory
Gasoline	Satisfactory
Benzol	Unsatisfactory
Turpentine	Swells
Linseed Oil	Satisfactory
Vegetable Oils	Satisfactory
Blacking	Satisfactory
Disinfectants (fly spray)	Satisfactory
Lacquers	Unsatisfactory
Lacquer Thinners	Unsatisfactory
Ether	Hardens
Soaps	Satisfactory
Stains and Dyes	Satisfactory (except where benzol & toluene are used as solvents)
Floor Wax and Polish	Satisfactory
Natural Gas Condensate Products	Unsatisfactory
Creosote	Unsatisfactory
Chlorinated solvents in general	Unsatisfactory
Tetrachloride	Unsatisfactory
Hypochloride	Satisfactory
Chloroform	Unsatisfactory
Food Products such as molasses	Special Compound Satisfactory
Food Products such as salad oils & dressings.	Special Compound Satisfactory
Food Products such as chocolate syrup	Special Compound Satisfactory
Food Products such as coloring for cheese and butter	Special Compound Satisfactory

Synthetic Resin-lined Equipment

Synthetic resin-lined equipment closely resembles glass-lined in many particulars. The same general mechanical construction is used in fabricating the articles to be lined. It is unnecessary to have heavy metal sections for resin linings, as they do not have to be heated to high temperatures during application. Synthetic coatings are applied to steel or other containers, either by spraying or brushing, and are hardened by evaporation of the solvent, chemical reaction, or vulcanization, depending upon the type of resin compound used. Synthetic resin linings have a marked degree of flexibility and are not easily damaged by mechanical impact.

Equipment is also available made from synthetic resins reinforced with fillers of asbestos or cotton fibres. This type can be made in solid sections with only superficial external metal supports.

Resin-lined metal equipment has practically no size limitations. The material may be applied in the field, and such heating processes as may be required can be carried out locally.

Dense, non-porous resin coatings are available that are easily cleaned. The simplicity of their application and their relatively low cost gives them a wide application in pharmaceutical, cosmetic, food and beverage storage fields.

Resin-linings are not suitable for use at high temperatures. Some types cannot be used above 180° F., while some others at present available, may be used at temperatures up to 350° F.

In general, resin-lined equipment is resistant to milk, alkalies, water, and many acids other than those which are strongly oxidizing. Most salt solutions can be handled, but all strong oxidants are liable to cause trouble. It should be borne in mind that not all resin-linings are resistant to the same types of corrosive materials. It is virtually impossible to tabulate the specific substances that can be handled by resin linings. A wide range of resins suitable for lining work are available and new ones are being constantly developed.

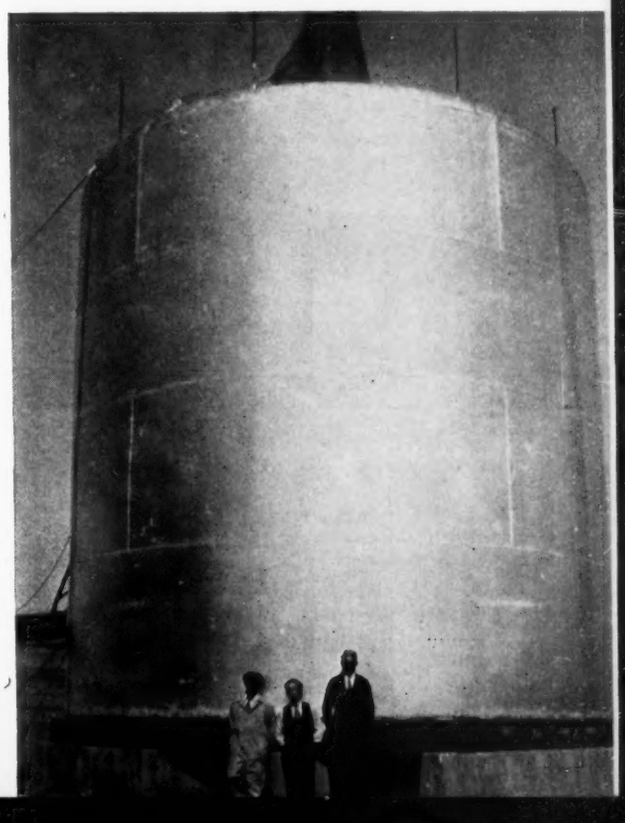
All-Metal Equipment

Vessels, pipe, and process equipment of all types and sizes can be fabricated from the corrosion-resistant alloys and metals. Unlike the products described above, each of which is capable of handling a relatively great variety of corrosive substances, the metals are limited in the scope of corrosive agents that any one metal resists satisfactorily. This fact, however, does not, in any way, prevent the metals from being one of the most important modern materials for the construction of corrosion-proof equipment. A wide variety of alloy steels, metallic elements and non-ferrous alloys are available and by proper selection, most of the corrosive substances in common use can be handled satisfactorily. Some of the alloys, such as chrome nickel steels which are finding widespread commercial application, are now available at reasonably low prices. The relatively high cost of some of the other alloys which are not used extensively, virtually prohibits their use for corrosion-resistant work, except in those cases where no other material will satisfactorily solve the problem. In addition to the alloy steels and non-porous alloys, there are a number of metallic elements which are frequently used for corrosion-resistant construction. These range from relatively cheap lead through aluminum and nickel to tantalum, a metal which, while very expensive, exhibits inertia to corrosive attack by a wide range of substances.

The limited scope of this article prevents detailed discussion of the various metals. Each alloy or metal has its own list of agents which it will resist, and these lists are available from the various metal manufacturers. It is only necessary to add a word of caution that, while an alloy or metal may satisfactorily resist a pure chemical, its resistance to corrosive attack by commercial qualities of the chemical may be entirely unsatisfactory due to the presence of small percentages of foreign substances. For this reason, it is always recommended that alloys be tested with the commercial materials that they will be required to handle and under similar conditions of agitation and aeration, both of which have a direct bearing on the metal's ability to resist attack.

Most of the corrosion-resistant metals can be machined and welded in much the same manner as steel, although some of them are so hard that they are difficult to machine, while others are only suitable for casting work.

Some of the corrosion-resistant alloys and metals are at times used as lining materials for structural steel, sheet lead being used extensively as a lining for steel tanks. Nickel and other metal clad sheets are available in the form of a composite consisting of a steel backing and a thin alloy face, which forms an integral part of the sheet. It is thus possible to reduce the overall cost of large equipment in some cases by using suitable lined or metal clad construction.



A 120,000 gallon rubber-lined tank erected recently in the South to store hydrochloric acid.

Booklets & Catalogs

Chemicals

A49. The Activator, complete alphabetical cross-index to the first 4 volumes, 1935-1938. N. J. Zinc Co.

A50. By Gum!, June, '39, with some good material on phthalic anhydride, especially a discussion by H. Reichhold, president of Reichhold Chemicals.

A51. The Caled Cleanser, May-June, brightly-presented topics in the dry cleaning industry. Caled Products Co.

A52. Catalogue of Products and Prices, May-June, the complete line of chemicals distributed by Magnus, Mabee, & Reynard.

A53. Chemistry and You, Vol. 16, No. 3, with major editorial attention to tetrasodium pyrophosphate. A. R. Maas Chem. Labs.

A54. Du Pont Magazine for June, '39, with many excellent photos of chemical displays at the N. Y. "World's Fair." E. I. du Pont de Nemours & Co.

A55. Durez Molder, May issue, announcing the 4th Annual Modern Plastics Competition; contains also latest doings in plastic shapes and moldings. General Plastics, Inc.

A56. Durez News, May, '39, with new ideas for packaging and interior decorations. General Plastics, Inc.

A57. Dyestuffs, an excellent quarterly publication, devoted to the technical side of dyes and dyeing; an important reference pamphlet, but easy reading. National Aniline & Chemical Co.

A58. Fertilizer Economics, June Edition, making clear "The what and why of fertilizer." American Agricultural Chemical Co.

A59. "Gunking," handy leaflet describing an all-round emulsion cleanser. The Curran Corp.

A60. New Paths for Profits, marketing guide to plastic materials for the businessman; well-illustrated and arranged for easy reading. The Bakelite Corp.

A61. Priorities for June; editorial treats of chemurgy in effective style, well worth having on the desk. Prior Chemical Corp.

A62. Rhoplex Resins; folder announces a series of textile finishing agents having marked capacity for improving fabric, owing to their crystal-clear colorlessness. Röhm & Haas Co.

A63. Schimmel & Co.'s notice of price changes, accompanying P. 51 of the looseleaf series of Briefs—technical highlights in cosmetic formulation. Schimmel & Co., Inc.

A64. Silicate P's & Q's, Vol. 19, No. 6, entertaining write-up on the place of silicates in paper pulp-making and finishing. Philadelphia Quartz Co.

A65. Soil Fumigation, pamphlet illustrating application of Larvacide as a soil fumigant and conditioner. Innis, Speiden & Co.

A66. "Vitalizing" Element, Zinc Sulfate, as a fertilizer for field crops, peaches, pecans, citrus, and tung trees. The Tennessee Corp.

A67. Wood-Preserving News, June, '39, with informative articles on lumber protection and timber construction projects, well illustrated. American Wood-Preserver's Association.

Equipment—Containers

E93. Acme Unit-Load, brochure demonstrating methods of packaging various commodities for truck and rail shipment. Acme Steel Co.

E94. Aluminum News-Letter, May, '39; featured are good snapshots of new all-aluminum railroad equipment and news of aluminum foil as a textile material. Aluminum Co. of America.

E95. Ball Mills, illustrated brochure giving complete information on new and improved grinding equipment. Allis-Chalmers Mfg. Co.

E96. Belting Biographies; manual furnishing in detail facts about belting and conveyor materials for the heavy industries. U. S. Rubber Co.

E97. Bristol Thermoverter, and other electrical measuring equipment, manufactured by the Bristol Co.

E98. Columbia JFS-Jr. Vari-Speed Controls, illustrated folder showing installations, with complete engineering data, of these models of speed transmission devices. Columbia Vari-Speed Co.

E99. Conco Torpedo Electric Hoist, illustrating a compact heavy-duty hoist, available in lug, hook, and trolley types. H. D. Conkey & Co.

E100. Drum Dryers, a 32-page handbook, superbly illustrated, of dryers and other equipment for pilot plant and processing. Buffalo Foundry & Machine Co.

E101. Economical Power, handsomely-designed guidebook to power-house machinery-turbines, generators, and steam auxiliaries—for the plant engineer. Westinghouse Electric & Manufacturing Co.

E102. Electrical Review, June, '39, a fine issue, magnificently supplemented by photography, devoted to power transmission. Allis-Chalmers Mfg. Co.

E103. The Houghton Line, Vol. 8, No. 3; informal and chatty editorial treatment of current topics; "not a yes-magazine." E. F. Houghton & Co.

E104. Ideal Catalog & Handbook, new and complete index to the many specialties for motor and maintenance equipment, manufactured by Ideal Commutator Dresser Co.

E105. Ipco Foggle Cloth, leaflet announcing a polishing cloth, especially valuable for retarding fogging of goggles. Industrial Products Co.

E106. Lead, May, '39, is devoted to coatings in service on sea and land; featured is a subaqueous pipe line, lead-caulked, laid in 1886. Lead Industries Association.

E107. "Lightnin" Mixers Catalog contains much entirely new information on side-entering mixing equipment. Mixing Equipment Co.

E108. Link-Belt Catalog, No. 1600; a new handbook of modern power transmission units, containing complete design and application data, cross-indexed for the convenience of design engineers and plant managers. Link-Belt Co.

E109. Link-Belt News, July, wide-awake news issue replete with illustrations; N. Y. "World's Fair" exhibit prominently displayed in this number. Link-Belt Co.

E110. Neoprene Notebook, No. 15; looseleaf folder, giving data for neoprene conveyor coatings and hose. Rubber Chemicals Division, Du Pont.

E111. Nickel Steel Topics, June, features special high-strength steels for steel mill equipment; looseleaf form handy for binding the trouble-shooting services offered by International Nickel Co.

E112. Oxy-Acetylene Tips, June, '39; displaying prominently fine welding with bronze-welding technique. Linde Air Products.

E113. Packomatic, May, brings a number of packaging tips for the specialty manufacturer. J. L. Ferguson Co.

E114. Patterson Catalog, No. 395, is a complete digest of company's mixing and processing equipment for chemical industry; 95 pages, handsomely printed. Patterson Foundry and Machine Co.

E115. Rotex Screeners, Bulletin 86, Illustrates a large line of screening machinery for pigments, flour, explosives, etc.; has convenient alphabetical layout for quick reference. Orville Simpson Co.

E116. Saybolt Viscosimeter Bulletin No. 701, includes specifications on a new viscosimeter for testing oils according to Method D88, ASTM. New device is illustrated in 2-unit and 4-unit models. Precision Scientific Co.

E117. Saco Speed Reducers, Catalog No. 7838, briefly outlines the salient features of a number of gear transmission units adaptable to processing machinery. Stephens-Adamson Mfg. Co.

E118. Steel Horizons, Vol. 1, No. 2, designed on the grand style, illustrates alloys in every-day service; has magnificent pictorial layouts. Allegheny Ludlum Steel Corp.

E119. Wire & Filter Cloth, a general catalogue, supplies engineering data on products for paper and pulp mills, as well as for other operations where sifting and filtering are involved. Multi-Metal Wire Cloth Co., Inc.

E120. Worthington Pumps and Coolers designed for service in the chemical processing industries. Worthington Pump & Machinery Co.

E121. Water Treatment, a handsomely illustrated brochure, is an account of the history and application of activated carbon materials to water purification. Sanitary engineers and water chemists should find this booklet of value, as the subject of taste and odor control is thoroughly presented in resumé form. L. A. Salomon & Bro.

Production of Aliphatic Diamines

In a method converting alkylene dichlorides to the corresponding diamines, the dichloride is stood with conc. aqua ammonia for several days. The amine hydrochloride so formed is distilled with alkali to free the amine. Process, as outlined in *Comptes Rendus,* Vol. 208, '39, p. 1,503, completely converts ethylene dichloride to ethylene diamine in about 50 hrs. at 68-70 deg. C. and propylene chloride to propylene diamine in 8-10 days at 75-80 deg. C. Side reactions are claimed not to occur, nor primary and tertiary chlorides to interfere. (*Chemical Age,* May 27, '39, p. 394.)

Resins from Mannitol and Sorbitol

High-quality varnish and lacquer resins may be obtained from derivatives of mannitol, sorbitol, and other hexahydric alcohols, according to a digest of new methods of lacquer manufacture, appearing in *La Revue des Produits Chimiques,* May 31, '39, p. 292. Mannitol and sorbitol, when reacted with phthalic, maleic, and similar acids, yield resinous esters comparable to the glyptals and alkyds obtained from lower alcohols; with rosin acids, hexahydric bases give rise to ester-gum types.

Manufacture of these esters requires considerably greater care than is ordinarily necessary in preparing simpler like compounds. Small batches produce the best results, when adequate mechanical stirring and exact control of temperature are provided. It is recommended that the vessel be evacuated, or else filled with inert gas, during the esterification. Precautions must be taken to insure the mixing in proper proportion of the ingredients, such that the reaction will be complete at the lowest possible temperature. Such safeguards are suggested mainly to avoid local overheating of the batches, because the decomposition products of the ingredients involved possess highly undesirable dark tints of color—sufficient to ruin the entire batch. By adding an oil blending medium (e.g., linseed oil) to the ingredients, modified air-drying resins may be produced in one operation, it is said.

Chemical Industries
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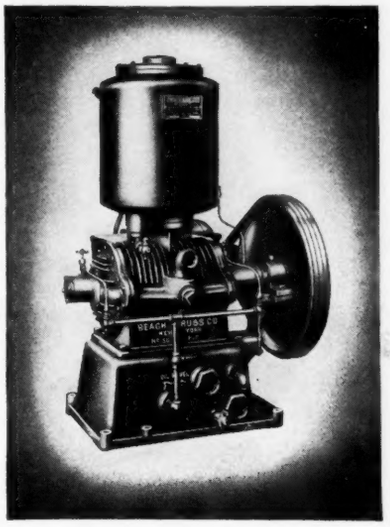
All information requested above *must* be given to receive attention.

New Equipment

High Vacuum Pump QC 19

Of recent design is a single stage high vacuum pump, which embodies a familiar rotary design incorporating many of the best features of rotary and plunger pumps. Vacuum pumps of the type illustrated are capable of maintaining a vacuum within 10 microns (0.01 mm.) of mercury on blank flange test in dry work and 50 microns (0.05 mm.) of mercury on blank flange test in wet work (McLeod gauge determinations). These results are adequate for usual commercial practice. For more exacting requirements, this design may be had in model giving 2-4 microns on blank flange test.



The pump has but four moving parts completely oil-sealed at all times. For dry work, a device is provided to maintain a constant and uniform flow of oil throughout the mechanism. In wet work, the lubricating mechanism automatically separates the air from oil and water without agitation of the liquids. In every case, the maintenance of vacuum is continuous and uniform.

Models up to 50 c.f.m. are air-cooled, and thus require no water fittings. Larger sizes, 100 to 1,100 c.f.m., have water jackets cast en bloc over the entire surface; the area of cooling surface being ample, relatively little cooling water is required. All models are characterized by their efficiency and economy of operation. For special purposes corrosion-resistant parts are furnished, to insure long life and clean operation.

Flow Recorder QC 20

A new flow recorder operating to indicate and record instantaneous values of rate of flow as measured by displacement meters has been developed and is being marketed. This device differs from the usual flow recording attachment for displacement meters in that it draws a graph of rate of flow against time instead of simply recording total flow over a given time.

Emulsifier Mill QC 21

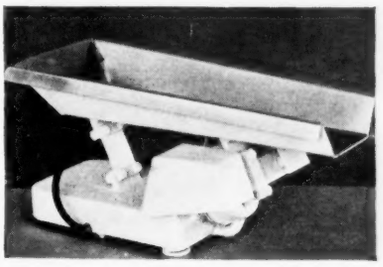
This machine, called a combinator, will grind various materials down to 1 micron (0.001 mm.) in diameter. It may also be used to emulsify, homogenize, mix, or separate. The mill has a wide range of application in the chemical, petroleum, and food processing industries; but, because it is new in the field—and because of its unique method of operation—the manufacturer has found necessary the processing of various products in the laboratory before sales can be satisfactorily effected. It is claimed that greases and special oil combinations have been successfully manufactured with the use of the homogenizer, as well as a number of food and pharmaceutical products.

Sulfuric Acid Drum QC 22

Well-known manufacturer of steel containers has just placed on the market a 2-piece, 55-gal. drum for sulfuric acid service. Drum is constructed from 2 seamless shells of flange quality steel welded together by a single weld at the midsection. The circumferential weld and side bung weld are such that the interior of the drum is smooth and free of crevices. Usual I-bar rolling hoops, required under ICC 5A specifications, are attached by separate lugs welded to the drum wall. Chimes, at top and bottom, are reinforced separately to protect the head—so formed as to further insure a smooth, crevice-free interior. After fabrication, drum is heat-treated, thereby increasing its resistance to corrosion by cone, sulfuric acid.

Vibratory Feeder QC 23

Rated at as much as 2,000 lbs. per hour of 100-lb. material such as sand, this small model is intended for finely-controlled feeds of down to a few lbs. per hour, as required in feeding chemical reagents. Control of flow rate is accomplished by regulating the vibratory action of a pulsating electromagnet, through a controlling rheostat. Latter is arranged for separate, remote wall mounting. This model, "F-O," provides finger-tip control of flow rate, with entire absence of moving and wearing parts.



Salt Tablet Dispenser QC 24

New type of salt tablet dispenser has been originated by a manufacturer of safety equipment. It is intended for use in plants where high-temperature processes are carried out, where the workmen require special protection from heat sickness. Dispenser is of black plastic molding, chemically inert to salt. Turning of a knob drops a tablet into the palm of the hand. Two sizes are available, one of 1,000 tablets, the other, 500.

It is stated that salt is needed by men working in temperatures above 90 deg. F., either indoors or out of doors, because depletion of body salt through excessive perspiration may cause heat sickness, characterized by cramps, nausea, dizziness, and muscular exhaustion. It is recommended that, under such severe working conditions, from 40 to 60 grains of salt be taken daily to replace lost body salt.

Chemical Industries
522 Fifth Ave., N. Y. City.

I would like to receive more detailed information on the following equipment: (Kindly check those desired.)

QC 19	QC 22
" 20	" 23
" 21	" 24

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New Chemicals for Industry

A digest of products and processes

DICYANDIAMIDE

What About Its Future?

By C. R. Caryl

C. R. Caryl, of the Stamford laboratories of American Cyanamid, reviews the early history of dicyandiamide ("Dicy" for short), indicates that a new method of production promises a lower price which undoubtedly will stimulate research on new applications of this interesting and very important chemical in organic synthesis.

The author "snapped" in his office at the Stamford, Conn., laboratories of the American Cyanamid Company.

CYANAMIDE molecules were first suspected of having something more than a platonic affection for one another as early as 1851. However, there were nothing but whispers about it until 1858, when Beilstein published the story. His column openly charged that each one of them was the other's affinity and that, under propitious conditions, they were accustomed to uniting in pairs. He even described the offspring, but the christening was delayed until 1862, when Haag chose the name "dicyandiamide." This was soon corrupted to Dicy.

Many years later, some members of the Dicy clan were found to be not above reproach. One out of every three would revert to two molecules of cyanamide, each of which would promptly wed one molecule of Dicy. Melamine was the offspring, but that is another story.

Possibly because of its ancestry, Dicy is extremely restless. Literally thousands of different compounds can be synthesized from its highly reactive molecules. During the 77 years since its christening, it has been the subject of a vast amount of research, the published results of which now comprise a rather voluminous literature.* Research in the first half of this period was very largely academic. Then at the turn of the century calcium cyanamide became available commercially through the work of Caro and Frank, followed rapidly by other synthetic fertilizers. This immediate result was to save the world from the famine which Sir William Crookes had predicted on the basis of the then apparent exhaustion of Chilean nitrate.

Photomicrograph of Dicy Crystals.

Another result of having calcium cyanamide available commercially was to stimulate practical research on cyanamide and Dicy, now with the idea that any new products of research need no longer remain in bottles as expensive laboratory curiosities but could find markets at reasonable prices.

Since the days of Caro and Frank, production of calcium cyanamide has grown enormously, reaching an all-time high in the fertilizer year 1937-38. The U. S. Dept. of Commerce estimates world production for that year at 305,000 metric tons of nitrogen, equivalent to more than 1,500,000 tons of calcium cyanamide. While most of this is served as food for various crops, respectable tonnages are used as raw material in the chemical industry.

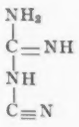
During the war ammonia derived from cyanamide was oxidized to help supply the unprecedented demand for nitric acid. Calcium cyanide from

* This literature has been reviewed and its more interesting features have been compiled in a pamphlet on Dicy, copies of which may be secured from the American Cyanamid Company.

the fusion of cyanamide with salt is now known in every gold and silver mining district in the world. From cyanamide liquid hydrocyanic acid is prepared and, together with the cyanide, is now familiar to thousands of fumigators whose business is the eradication of insect pests. It is equally important as a raw material in the manufacture of rubber accelerators, prussiates, etc.

That Dicy has not kept pace with the phenomenal growth of calcium cyanamide has undoubtedly been due to the fact that until recently it has been in the price class of fine chemicals. However, a new and more efficient method for its production from cyanamide has just been put into operation and the lower costs have already been reflected in lower prices. This should not only stimulate further research on new applications for Dicy but should also justify a review of the results of previous work.

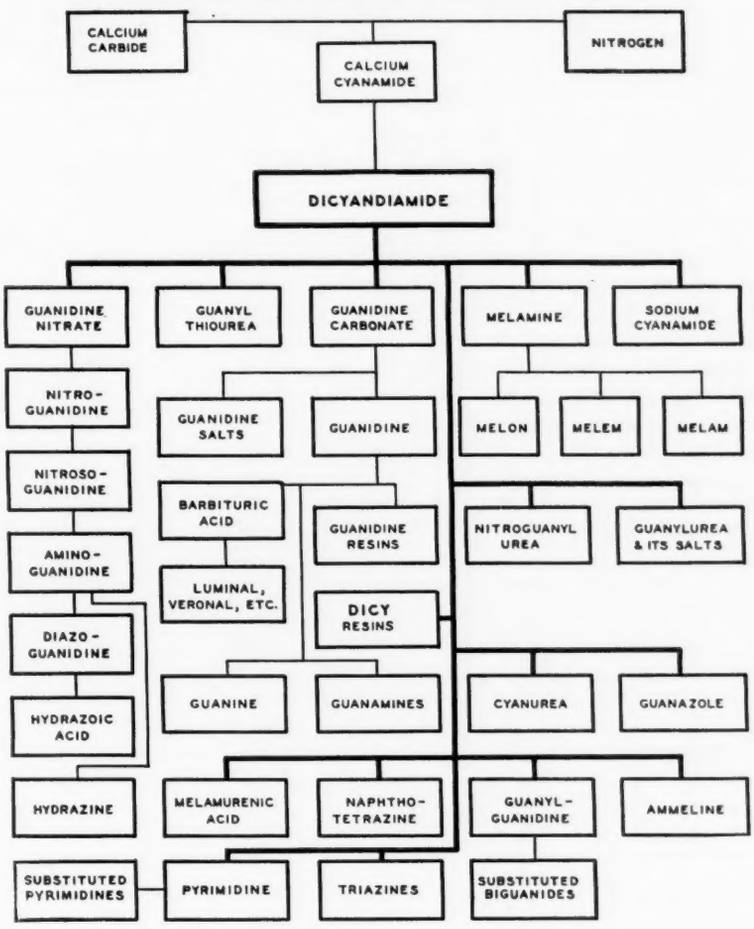
Dicy itself is a white crystalline powder, stable and non-hygroscopic, even on long storage. It crystallizes in monoclinic prismatic plates. Its structural formula has been the subject of a great deal of controversy and as recently as 1935, one investigator stated that its structure is still in doubt. However, the most generally accepted formula, and the one that explains the most of its reactions, is the cyanoguanidine structure:



Dicy as such has comparatively few direct commercial applications. Its value is chiefly as a raw material for the synthesis of other products. For example, it has been used for many years in the synthesis of Veronal and related soporifics.

Numerous U. S. and foreign patents have covered Dicy and compositions produced from Dicy for the most varied purposes; for example, as a stabilizer for nitrocellulose, as a retarder of rancidity in fats and oils, as an anti-knock compound in gasoline engines, for raising the fusion point of molded shellac insulators, in the manufacture of synthetic plastics, resins and adhesives, dyes, explosives, pharmaceuticals, rubber chemicals, unhairing agents, and so on almost indefinitely. Several prominent organic chemists have stated (and it would now seem that their predictions are about to be fulfilled) that Dicy will undoubtedly become as important a fundamental in organic synthesis as alcohol and benzol.

DICY AND SOME OF ITS RELATED COMPOUNDS



New Products

Direct Spinning of Viscose Rayon Method for the direct spinning of dull-lustered viscose rayon, developed by I. G. Farb. Akt.-Ges., is described in E. P. 499,827 (1937). The spinning bath (a Müller bath), contains magnesium sulfate alone, or in conjunction with zinc sulfate, and a high-viscosity viscose prepared from unripened alkali cellulose in which is emulsified an additional liquid insoluble, or sparingly soluble, in the viscose. This added insoluble liquid compound may be one of a number of aliphatic or hydroaromatic alcohols. Dispersing agents, such as alkyl esters of high molecular fatty acids or turkey red oil, may also be added. (*Chemical Trade Journal*, May 5, '39, p. 461.)

"Textolite" Woven Wood Strips of wood veneer, impregnated with plastic resins, are fabricated into decorative paneling of unusual strength and toughness, by a process developed by Parkwood Corp., Leominster, Mass., in cooperation with General Electric's Plastics Dep't. at Pittsfield. Plastic binder is one of the G. E. "Textolite" resin varnishes, producing in the fabricated panel a tough veneer finish. The resin-coated strips are woven into the desired pattern and then permanently heat-bonded to a "Textolite"-laminated material under pressure. Paneling sheets thus produced may be mounted on suitable permanent backing. Material is unaffected by moisture or alcohol, and resistant to most common acids, it is reported. The lamina are so pliable that they may be stitched or cut with ease, and have a glassy-smooth surface resembling highly-polished mosaic.

"Neoprene Latex 57" Latex Type "57" is an alkaline, aqueous dispersion of neoprene particles, for which is claimed good mechanical and chemical stability. Emulsion is thinner than rubber latex at the same concentration, and may be thickened with gums, starches, gelatin, casein, and other materials. Particles are said to be uniformly of about 0.1 micron (0.0001 mm.) diameter, having vigorous Brownian movement, and are negatively charged. Neoprene in the latex may be coagulated with alcohol or acetone, as well as by salts, acids and by drying. Boric acid and sodium fluosilicate act as gelling agents for the dispersion. It is claimed that "Latex 57" is readily compatible with natural rubber latex, special precautions being unnecessary.

Chemical Specialties for Industry

A digest of new uses and new compounds

HOUSEHOLD SCOURING MATERIALS

DR. CHARLES F. MASON, chemical consultant, first classifies the various types of household soaps marketed, discusses the general chemistry of soap-making, reports on the fillers generally employed in the manufacture of scouring materials, and suggests a number of practical formulas for those interested in the manufacture of scouring cleansers.

HOUSEHOLD scouring materials which have been undergoing gradual improvement with advances in colloid technique and equipment can be classified under the general heading of soaps, the commercial grades of which are usually classified or assigned a name, descriptive of the form in which it is sold or the purpose, to which it is to be applied. The starting materials used, the chemical composition and the presence of substances injurious to certain objects have not to date been used for classification purposes except in rare cases.

Some of the more general names are listed below and cover the majority of soaps sold to-day.

1. White floating soap
2. Laundry soap
3. Hand grit soap
4. Salt water soap
5. Soap powders
6. Automobile soap
7. Scouring compounds
8. Grit soap
9. Soap chips
10. Mechanic's oil soap

Large users like textile finishers, laundries and similar fields specify the percentage limits of the ingredients, which will be tolerated for the best results, but in the case of products for household consumption, where the user must take the major portion of the responsibility for damage, a happy medium is struck with the best knowledge available in this field.

Hand grit, scouring and grit soaps are described in this article with particular emphasis upon the merits of different fillers, recent improvements in their preparation, and methods of incorporation. The first one to incorporate a coarse powder with sharp edged particles into a soap to produce either a hard cake or a soft paste may have been motivated by the original practice of our ancestors, who mixed sand with lathered soap to remove grease from their hands. However, with advances in our knowledge of colloids, soap producers have availed themselves of this technique and as a result the trend has been toward finer particles of less hardness than silica sand and incorporated while the soap is being made, rather than into a soap stock already on hand.

Before discussing the question of detergent action a few remarks should be made upon the broad subject of soap itself for the benefit of any readers, who, through lack of contact with this subject, may have become hazy upon some of the basic principles. To the average person soap is a compound formed by mixing either hot or cold, a fat and an alkaline solution, with the aid of heat if the fats are solid at ordinary temperatures and without heat, if they are liquids or, a more common term, oils.

In other words the free fatty acids of the fats are neutralized by the alkali and the esters (salts of fatty acids and glycerol) are decomposed into more free fatty acids and glycerol; the alkali being present in such a quantity that all fatty acids originally present and later formed are converted into alkaline salts or soaps. For soft soaps caustic potash was used and for hard soaps caustic soda, but due to the price of the former, soft soaps are made to-day by incorporating water with hard sodium soaps. Those of alkaline earth and heavy metals are insoluble in water and for this reason are unfit for cleansers and are confined to special uses.

Since it is difficult to control accurately the correct amounts of alkali and free fatty acids present, the average soap contains an excess of one or the other. In the case of laundry soaps an excess of alkali may not be detrimental, but in case of toilet and cosmetic soaps superfatting agents are added to guard against alkali injuring the skin. The table below contains chemical analyses of two soaps and consideration of it will make this point clear.

Total fat	65.02%	67.90%
Combined alkali	7.68%	6.78%
Sodium Carbonate	0.97%	...
Water	...	12.28%
Unsaponified fatty acid	0.67%	2.00%
Unsaponified fat	0.67%	0.35%
Rosin	6.80%	7.90%
Glycerin	...	1.08%
Rock salt	...	0.60%

Obviously, the figures in each column do not add up to the proverbial one hundred per cent., which so many practical people demand in any analysis but the difference

can be attributed to water; a component, which can vary in content without affecting the hardness as measured by rule of thumb methods. Moreover, it fails to indicate, whether the fat is an individual one or a mixture; only the content of rosin in it having been reported. However, it shows that unsaponified fatty acid is present and the alkali is not in excess, a very desirable property.

When either one of these soaps is dissolved in water, hot or cold, in large or small volume, a process sets in, which is known as hydrolysis: in other words the sodium salt decomposes with the aid of water back again into free fatty acid and free caustic soda, the extent of which depends upon time, temperature and the amount of water present. Simultaneously bubbles form and this is explained by the surface tension. The surface of the pure water behaves as though it is a skin under tension and capable of being stretched to a larger area but, when the soap is present this tension is lessened as evidence by a larger surface in the form of soap bubbles or skins of soap dissolved in water.

To act as a detergent this soap solution, dilute or concentrated, must first wet or adhere to a greasy spot, then emulsify the grease and finally stabilize the emulsion, so that the grease particles will remain in such a fine state of subdivision as to be suspended until washed away. In some operations this time interval is short, but in large laundry operations it might be two to three hours.

In the case of sample two we have a suspension of soap, free fatty acid, unsaponified fat in a water solution of glycerin salt, and free alkali. No doubt each play their respective roles in proportion to their percentage content and upon the processes so far mentioned namely; surface tension, emulsification and adsorption. The phenomenon of adsorption can be described as the selective attraction of some substances for others and is involved in the process of wetting.

Theory of "Surface Activity"

One popular theory, which has been quite well substantiated, involves the term, "surface activity" and attributes it to the interaction of free caustic soda formed by hydrolysis with free fatty acids of the grease being removed and in case the grease is a mineral oil having no free fatty acid present, the undecomposed soap is absorbed upon the spot and by agitation emulsification results.

The surface activity has been measured with varying amounts of free caustic alkali and the results indicate an increase too high to be attributed to the suppression of free fatty acid present as a result of hydrolysis. From these scanty descriptions of fundamental phenomenon, one can see that the present status of our knowledge upon detergent action depends upon advances in colloid technique, where adsorption, hydrolysis, surface tension, emulsification and polarity of suspended particles (micelles) are acting simultaneously.

A scientific unit and a mechanical method of measuring detergent action is reported from time to time in the literature and may be adopted widely in the near future. It will be of service in formulating and testing commercial soap mixtures before being placed upon the market. In that it is a measure of the time to remove stains from goods under set conditions it should be an improvement over specific tests like strength of foam, which have been suggested.

Fillers for soaps were for a long time chosen at random; the only criterion being to choose something different from that of the competitor and over the years the following have been reported.

1. Sodium Carbonate
2. Sodium Bicarbonate
3. Ammonium Sulfate
4. Borax
5. Sodium Phosphate
6. Sodium Perborate
7. Sodium Persulfate
8. Sodium Sulfate
9. Calcium Sulfate
10. Sodium Chloride
11. Sodium Silicate
12. Talc
13. Pumice
14. Barite
15. Kieselguhr
16. Colloidal Clay
17. Saw Dust
18. Volcanic Ash

Each and every one of these possess certain merits for different purposes if finely ground and intimately mixed with the soap stock; the two bleaching fillers sodium perborate and persulfate have met with a welcome reception in the trade.

Colloidal clays and closely related fillers have received the most attention in the past two decades and by carefully regulated experiments it has been proven, that they impart many desirable properties. They aid in the saponification of the fats if incorporated during the production of the soap. Moreover, the time for aging is lessened and more persistent lathers are obtained.

This has been made possible by the producers of clays, who, instead of only drying and screening them, have installed slurry classifiers, the effluent from which contains deflocculating agents and only particles, which vary in diameter within narrow limits. This effluent is then discharged into another tank, where reflocculating agents are added. After drying and disintegrating, the product is ready for use in soaps and contains brittle aggregates of particles, which possess detergent action and are devoid of abrasive effects.

Combination of Fatty Acids

Although no reliable information is available that one soap is superior to another in respect to the fatty acids used and detergent properties, the tendency has been to combine many fatty acids into one soap for no other reason than that some property may be improved. The following formula illustrates this.

Rosin	57	
Palm Oil	8	
Bone Grease	73	
Tallow Oil	65	
Tallow	57	
Cocoanut Oil	245	
Sodium Hydroxide Soln.	188	38 Baume. or 32%
Sodium Silicate Soln.	200	25 Baume. or 32%
Colloidal Clay	107	

The fats are melted in one container and the alkaline solutions are heated to about 65° C. in another while the colloidal clay is stirred in. The molten fats are then added slowly to the second container with agitation and the usual precautions of filling the container to about one-third of its capacity and feeling to see if the soap adheres or not, avoidance of foaming over by the experienced soap maker. These are testing with a paddle of the stock near the finish to see if it has lost its adhesiveness and can be molded between the fingers.

After aging to allow for shrinkage and cooling it is cut into cakes or pressed into cans, because this will be a plastic soap.

Palm Oil	10
Castor Oil	10
Stearic Acid	6
Sawdust	6
Sodium Hydroxide	4
Water	63
Pine Oil	1

As usual the fats are melted in one container and the sodium hydroxide is dissolved in another container in which only 14 pounds of the total water is present. The molten fats are poured gradually into the alkaline solution with stirring and when saponification is complete the sawdust and the balance of the warm water are stirred in and the product is allowed to cool. This is a plastic soap, which is sold in tin cans for mechanic's use. The high content of water indicates the reason why such products can be sold at such reasonable prices.

Volcanic Ash	90
Sodium Carbonate	6
Powdered Soap	4

This is sold in dry form and is made by simple mixing in the dry form. It is used for cleaning kitchen utensils, sinks, and objects, which are not injured by strong abrasives and alkalies. For volcanic ash other fillers can be substituted, in whole or in part to give the desired properties for peculiar demands of customers.

Water	22
Fats	36
Sodium Carbonate	38
Sodium Hydroxide	4

New Specialties

This is one of the typical soap powders which is sold in granulated form for mechanical dish washers and laundrying operations. The fat, water and sodium hydroxide are mixed as above and the soap allowed to cool, harden and age. It is then passed through a shredder, which disseminates it into granules and when the operation is about finished the sodium carbonate is added slowly and time allowed for its distribution throughout the mass.

Large hotels have been purchasing solid abrasives in brick form for cleaning cooking utensils and the economy in use of soap powders justifies the added cost of the bricks. They are sold under the name of phosphate bricks and their production is closely guarded. No doubt other salts than phosphates are fused into the mixture to impart mechanical properties, because the brick does not crumble at any time in its life but remains firm until worn to a small fragment.

From this brief description of a broad field the writer wishes to emphasize that even though soaps and scouring materials were made and used by the ancients, progess in their perfection has not stopped and advances are being reported annually.

Protective Coating Wilbur & Williams Co., Boston, Mass., has developed a protective black resin material, "Causticbond" as a coating for wood or metal exposed to liquid acid or caustic. "Causticbond" gives a black, semi-gloss finish, recommended for lining tanks, whether of wood, metal or concrete, or for painting machinery exposed to the spillage of such corrosive products.

New Textile Assistant A special-type alkyl sulfate finishing agent, Du Pont's new "Avitex VS," is designed to give a finish of very smooth surface and fairly full hand on many types of spun rayon materials and on rayon flat crepes, twills, serges, and taffetas. It is said to impart a finer-grained quality appearance and to produce a greater resistance to soiling. "Avitex VS" is said to be stable to acid and alkaline solutions, and resistant to calcium-magnesium hard waters.

Canvas Coating Compounds W. E. Hooper & Sons, Philadelphia, has placed on the market two dressing formulas for treating old or new canvas. "Impregnating Compound" gives all cotton duck fabrics a finish resistant to fire, water, mildew, and wear, according to the manufacturer, who claims that canvas thoroughly treated with this product fully meets the requirements of Federal Specifications CCC-D-746 for fire-, water-, and weather-resistant cotton duck. "Finishing Compound" is a coating for quickly refinishing old canvas, and has the same basic formula as the above, but yields a harder finish. Both products are available in all standard colors, and are applicable to many types of heavy-duty fabrics.

All-Purpose Wax Polish Cleansing and waxing of all types of surfaces are performed by a double-action preparation of Midwest Mfg. Co., Detroit, called "Enduro Polish-and-Cleaner." Company states that surfaces are simply wiped with a pad moistened with "Enduro," and then brought to clear, brilliant lustre by easy rubbing with a clean, dry cloth. Product contains no turpentine or saponified oils, claims the manufacturer, and definitely eliminates the necessity for hard, persistent rubbing in order to obtain a good polish.

Glass Brake Lining Brake lining material of glass fiber bonded with a synthetic resin has been patented by General Motors. Claimed for the new lining are resistance to humidity, and superior insulating qualities when compared with other fibrous lining materials.

Stop-Off Lacquer A non-pigmented type of lacquer for insulating plating racks has been developed by Michigan Chrome Co., Detroit, Mich. This lacquer is compatible in every way with the red and black stop-off lacquers that this company manufactures for rack insulation purposes. It can be applied directly to metal surfaces without elaborate preliminary cleaning. This coating material, it is said, has proven impervious to mineral acid dips, cyanide baths, and other plating solutions, as well as to nitric and hydrofluoric acids.

Bake Enamel An almost water-white finish is produced by this new bake enamel for metals, a product of Hilo Varnish Corp., Brooklyn, N. Y. "Vitra-Carlite Clear" is said to be an especially suitable enamel for metals, wherever the article to be coated will stand an hour's baking at 250 deg. F. It may be used as a finishing coat over metals, metallic finishes, and colored enamels, wherever a thin coat will give added luster and surface hardness.

Rubber Mold Coating Standard Oil of N. J. has introduced a line of non-drying coatings for protecting rubber molds against rust. Company's new products, trademark "Rust-Ban," are said to be a definite improvement in non-drying coatings for this purpose.

Cork-Resin Plastic Kautex Plastics, Ltd., of Elstree, Herts, England, manufacturing a series of cork-composition materials under the name "Kautex," has recently found several important new uses for its well-known products, especially in the automotive, aircraft, building, and construction fields. These processed cork-resin plastic materials have been found excellent substitutes for rubber in many fields and, moreover, possess numerous advantages over rubber-fabricated materials of like nature.

Mortar Color "Colormix," a new product perfected by Master Builders of Cleveland, is a finely ground powder of intense dyeing power for mixing into cement mortar to produce color all the way through. In addition it contains Master Builders' "Omicron," a unique water-reducing agent which assures much higher strength, minimum porosity, and freedom from shrinkage, cracking, all of which make for better and durable floors.

New Delustrant "Dullit S" General Dyestuff Corp., N. Y. City, releases a substantive delustering agent particularly suitable for rayon, real silk, and staple fibre materials. It is claimed that "Dullit S" imparts a very soft, full handle to fabrics, is fast to rinsing, and unaffected by hard waters.

"Hi-Tox 20" New pyrethrum insecticide concentrate, prepared by Associated Chemists, Inc., Chicago, Ill., is said to be an efficient and superior material having excellent knock-down and kill ratings. Manufacturer states that "Hi-Tox 20" is a neutral, non-irritant and non-staining concentrate stable to effects of age and exposure to light and heat.

Finishing Enamel Sherwin-Williams Co. has placed on the market a versatile finish, Kem Lustral Enamel, for interior and exterior wood and metal surfaces. The product may be applied in any number of ways, but is said to produce a smooth, mirror-like finish of good lasting quality; enamel may be had in all colors.

Insecticide and Disinfectant Makers

Discuss "Pros and Cons" of

LABELING and MARKETING

By James E. Lounsbury, Jr.

Editorial Staff, Chemical Industries

RECORD attendance and lively debates were features of the N. A. I. D. M.'s June meeting in the Biltmore Hotel, N. Y. City. Nearly 300 representatives from the chemical specialties field were present June 5 and 6, mostly to discuss the Federal Food, Drug, and Cosmetic bill. Committee reports and papers presented were largely devoted to the interpretation of these measures pertaining to disinfectants and insecticides as well as to a host of drug and cosmetic items. Enforcement of the new legislation, coupled with the demands of organized consuming groups, will undoubtedly lead to a revamping of present methods of labeling and marketing—this was the gist of all recommendations made to the convention.

In his address as presiding officer of the Association, J. L. Brenn, president, Huntington Labs., Huntington, Ind., stressed the fact that the N. A. I. D. M. was certainly serving a need much greater to-day than ever before, and that the wholehearted support of every member was proportionately more necessary at the present time. He said, in part:

"Personally, after 20 years of continued membership and rather close contact with the affairs of the Association and over 25 years of experience in my own particular field, I am convinced that the Association has more than justified itself, that my firm has gotten its money's worth out of it, and that there is more need for it to-day than there was some years ago."

"I think a lot more insecticides, disinfectants, and sanitary supplies could be sold than are being sold, if we would make the public at large more conscious of the need for these products, and a trade association working for its particular industry as a whole instead of for itself can do a job vastly more influential and for a lot less money than any of us alone."

Of invaluable service to members of the N. A. I. D. M. has been Dr. H. C. Fuller, Washington, D. C., technical consultant to the Association. He was present to conduct the well-attended "Question and Answer Clinic on Labeling." He said that the Federal bill is designed to include all insecticides and disinfectants designed for treating disease in man or animal and thus arsenical dips, coal-tar disinfectants generally, and lime sulfur dusts become subject to its provisions—as does any product having as an ingredient a chemical classified under the new measure as a drug. In reply to a number of questions from the floor, Dr. Fuller stated that no recommendation made by himself could be regarded as legally authoritative and reminded his audience that many products lie on the border line with respect to their status under these acts and must await the actual ruling of the Administration.

Dr. E. R. McGovran, Bureau of Entomology and Plant Quarantine, one of the speakers at the meeting.

The labeling discussion emphasized the need for standardizing tests for effectiveness of insecticides and disinfectants. Dr. F. L. Campbell, in charge of the Association's Fellowship at Ohio State University, Columbus, presented in a short, well-illustrated paper the salient facts about test methods against crawling insects, specifically, the German cockroach and the bedbug. Dr. E. R. McGovran, Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture, reported results obtained against the house-fly with pyrethrum sprays. It was shown that an initial application of a concentrated pyrethrum extract, followed by one of relatively dilute extract, would produce a higher mortality than if the initial spraying was with dilute solutions of pyrethrum. The latter appear to develop in the housefly a resistance to further dosage with the same material. Mr. W. N. Sullivan, also of the Bureau, described the relative toxicities against the housefly of a number of optically-active rotenones and related compounds, and compared the results with those obtained with optically-inactive like materials. Further research with the active extracts, he said, may uncover an effective new fly spray material having better-than-average toxicity.

Disinfectants in general were discussed by Dr. E. G. Klarmann, Lehn & Fink. His report aroused much interest and brought numerous questions from the audience. It was emphasized that, contrarily, a disinfectant might prove unsatisfactory in field trial, despite the fact that laboratory tests (e.g., study of toxicity on bacterial cultures) showed "adequate" germicidal activity. Dr. Klarmann pointed out the necessity for thoroughgoing tests, both practical and laboratory, upon disinfectant materials—unless this is done, manufacturers would have some difficulty with the new State and Federal labeling requirements. The Association, through its Disinfectant Scientific Committee headed by Dr. Klarmann, is planning to establish a standard method for the determination of fungicidal action in disinfectants. Upon the adoption of such a method as an Association Standard, it will be recommended to the Food and Drug Administration as an acceptable fungicide method of test.

Dr. Walter H. Eddy, Good Housekeeping Institute, declared himself in favor of bigger and better labels and "directions-for-use" literature. Referring to hundreds of letters received by the Institute from housewives—all asking the same question: "How can I get rid of moths?"—he recommended to the convention that more directions be given consumers of moth-repellants on how to use these materials effectively. Each label, and each set of instructions, should tell clearly what the product will do and explicitly outline an efficient way

Left to right, Dr. Alfred Weed, John Powell & Co.; M. S. Barker, M. M. & R.; William O. Buettner, secretary of the National Pest Control Association; William F. Kroneman, Dodge & Olcott; A. Weiner, Standard Naphthalene Products; Herman Bercow, H. H. Rosenthal Co.; and Philip E. Haebler, Van Ameringen-Haebler, Inc.

of using the product, he said. By helping the consumer to put the purchase to good use and thereby gaining a satisfied customer, Dr. Eddy concluded, the manufacturer will enjoy an expanding volume of sales.

E. L. Singler, secretary, Maple Flooring Manufacturers' Association, spoke of the co-operative advertising program sponsored by his organization. Mr. Singler described the vast market for the producer of wood finish specialties, to be found in the redressing of old and worn maple flooring, and which the advertising program is intended to stimulate.

Melvin Fuld, Fuld Bros., Baltimore, gave a resumé of an exhaustive study of test methods for self-polishing waxes. The Fuld Company has devoted much time and money to research on this problem, with most promising results. Mr. Fuld brought with him a number of test devices with which he has been working; of these, he considered most valuable the Sward Rocker and a chrome-plated, tin sheet standard surface. Rocker is used to indicate, by an arbitrary index number (with reference to a standard surface), a sum total of various characteristics of a waxed surface, such as tack, hardness, slip, wear, powdering, and the like. The chromed tin-plate was described by Mr. Fuld as having proven best of a large number of would-be ideal waxing surfaces suitable for testing self-polishing waxes. He said that reasonably reproducible data had been obtained upon such a strip, about the size of a roofing shingle, using different wax formulas.

Some little-known facts about carnauba wax production were presented in a short talk by J. T. Connolly, W. R. Grace & Co., N. Y. City. Methods and data relative to the Brazilian carnauba industry were well presented. Mr. Connolly substituted for J. E. Godoy, of the same firm, who was in South America at the time.

N. A. I. D. M.'s legislative committee, lead by C. L. Fardwell, McCormick & Co., Baltimore, was somewhat handicapped by lack of last-minute news from State legislatures in session during early June. Some, if not all, of nine states were expected to make final disposal of food and drug, or drug and cosmetic bills during that period. The Federal act, if not modified by the Lea amendment, was to have gone into effect on June 25. Latter bill, regarded favorably by both Senate and House, would defer the effective date of certain sections in the Federal law to January 1, 1940—certain other items would not be enforced until July 1, 1940. On the whole, Association members regarded new enactments as beneficial in the long run, although these modifications may temporarily inconvenience them to a greater or less extent.

Remarkable at the mid-year conference was the common demonstration of interest in matters relating to standardization and marketing. Most urgent, however, was the Association's concern with problems of legislation affecting directly the insecticide and disinfectant groups. Gordon Baird, Baird & McGuire, Holbrook (Mass.), spoke for the Public Purchases Committee of which he is chairman, touching briefly on the nature of measures currently before 44 State legislatures. Indiana, Maryland, Montana, North Carolina, Florida, Nevada, and Pennsylvania are states in which important legislation has either become law or is now under consideration, it was reported. Certain of these bills relate only to insecticides, but others include several chemical specialty groups, said Mr. Baird. Mr. Baird found that some states have no specifications for the public purchase of sanitary supplies, in contrast to a few who set for prospective bidders unreasonable and contradictory requirements.

At the close of the two-day session, major issues necessarily remained as "unfinished business." December's meeting, to be held at Washington, D. C., will consider recommendations for a N. A. I. D. M. Seal of Approval, to be reported upon at that time by the Insecticide Marketing Committee whose chairman, H. A. Thomas, Shell Oil, heads a special group concentrating on this project. One or more test methods for the evaluation of disinfectant and insecticide preparations may be ready for submission to the Food and Drug Administration by that time. Next meeting of the Association will feature the annual election of officers.

Left to right, "Joe" Magnus of M. M. & R.; W. J. Zick, of Stanco, who acted as chairman of one of the sessions; J. E. Ferris, Electro Bleaching Gas; Joseph F. Nelson and E. T. Statler, both with Wilson & Bennett Mfg. Co.

New Trade Marks of the Month

MASON-SEAL
367,336

MELOCOL
403,477

MELOPAS
403,479

405,707

Castle Mortar
408,205

NITROKA
411,112

413,233

413,416

PEE-GEE
413,797

Tecuta
413,847

NIMBUS
414,238

GUAI-A-PHENE
414,344

414,385

MICRONIZED
414,566

NUADE
414,603

RENAVENE
415,041

SILO-PHOS
415,074

415,186

RYD-RIZE
415,262

WEATHER-TEX
415,481

SURFAX
415,596

MEDLEX
415,779

MORPEL
415,849

MORPELTEX
415,850

MORPELWET
415,851

KEMPRUF
416,108

VISOCO
416,218

APPRAMINE
416,301

Polymex
416,397

UNION
416,489

UNION
416,490

DICOLOID
416,549

416,598

KODAK
416,646

STAFLUX
416,708

KROMOTONE
416,547

HALODOL
416,727

LUBE-PLUS
416,771

CAPADERM
416,779

416,788

LOOMKILL
416,806

LAMITE
416,882

MYSTOLENE
416,889

Trade Mark Descriptions†

367,336. Calbar Paint and Varnish Co., Philadelphia, Pa.; Jan. 29, '38; for plastic-form coatings for brick, stucco and concrete; use since Nov. 1, '37. Not subject to opposition.

403,477 and 403,479. Society of Chemical Industry in Basle, Basel, Switzerland; Feb. 26, '38; for tanning agents and textile assistants; use since Nov. 5, '37.

405,707. United Refining Co., Russell, Kan.; Apr. 25, '38; for gasoline, motor oils, and greases; use since Apr. 1, '38.

408,205. Pine Hill Lime & Stone Co., Pine Hill, Ky.; July 5, '38; for masonry cement, stucco, and a plastic cement; use since Jan., '38.

411,112. Jacques Wolf & Co., Clifton, N. J.; Sept. 29, '38; for product to be used as an ingredient for lacquers and paints; use since Oct. 8, '37.

413,233. New Zealand Co-Operative Dairy Co., Ltd., Hamilton and Hamilton, Auckland, New Zealand; Nov. 28, '38; for raw and partly prepared casein; use since Aug. 3, '37.

413,416. Monsanto Chemical Co., St. Louis, Mo., Dec. 2, '38; for plastic compositions in powdered form, or in molded or cast form; also, in form of sheets or films for transparent wrapping or containers; use since Oct. 19, '38.

413,797. Pope & Gray, Inc., N. Y. City; Dec. 13, '38; for printing and lithographic inks; use since Feb., '38.

413,847. Vereinigte Deutsche Metallwerke Aktiengesellschaft, Frankfort-am-Main-Heddernheim, Germany; Dec. 14, 1938; for bituminous adhesives and cements, and luting materials; use since 1929.

414,238. The Refinite Corporation, Omaha, Nebr.; Dec. 27, '38; for water-softening apparatus containing zeolite crystals as the principal agent; use since Dec. 12, '38.

414,344. The Glidden Co. (Southern Pine Chemical Co.), Cleveland, O.; Dec. 30, '38; for mixture of resinous-pinewood phenols used as anti-oxidant for preventing gelling and skinning in paints and other coatings; use since June, '32.

414,385. Western Railroad Supply Co., Chicago, Ill.; Dec. 30, '38; for insulating preservative paint; use since 1910.

414,566. International Pulverizing Co., Moorestown, N. J.; Jan. 6, '39; for pulverized clays; use since Dec. 23, '38.

414,603. Nuodex Products Co., Inc., Elizabeth, N. J.; Jan. 7, '39; for chemical grinding agents; use since Dec. 29, '38.

415,041. Ralph E. Inson, N. Y. City; Jan. 20, '39; for polish and cleaner for woodwork, painted and enameled surfaces, and the like; use since Mar. 6, '36.

415,074. Cooperative G. L. F. Soil Building Service, Inc., New York and Ithaca, N. Y.; Jan. 21, '39; for chemical preparations to keep green hay and feed in silos; use since May 24, '38.

415,186. Radiant Finish Co., Chicago, Ill.; Jan. 24, '39; for varnish-like finish for automotive equipment and the like; use since Apr. 2, '38.

415,262. Richard Ryder (Reliable Sales Co.), Hartford, Conn.; Jan. 26, '39; for automobile and furniture polishes and waxes; use since June 1, '35.

415,481. I. F. Laucks, Inc., Seattle, Wash.; Feb. 1, '39; for plastic wall coating compounds applied to surfaces of plywood, brick, stucco, and metal to stimulate a plastered wall surface; use since Jan. 23, '39.

415,596. E. F. Houghton & Co., Philadelphia, Pa.; Feb. 4, '39; for chemical cleansing and washing compositions in liquid and solid form, for use in aqueous baths for cleaning fabrics; use since May 16, '38.

415,779. Industrial Soap Co., St. Louis, Mo.; Feb. 8, '39; for sweeping compound, metal polish, toilet soap, oil soap, and cleanser; use since Jan. 25, '39.

415,849. Morton Chemical Co., Greensboro, N. C.; Feb. 9, '39; for finishing oils, dyeing oils, penetrating oils, coning, wool, silk-soaking and silk-degumming, oils and delustering agents; use since Nov. 19, '34.

415,850. Morton Chemical Co., Greensboro, N. C.; Feb. 9, '39; for series organic specialties; use since Mar. 18, '37.

415,851. Morton Chemical Co., Greensboro, N. C.; Feb. 9, '39; for series of organic wetting and penetrating agents for fibres and chemicals; use since Jan. 19, '38.

416,108. National Carbon Co., Inc., N. Y. City; Feb. 16, '39; for carbon bricks and raschig rings; use since June 2, '37 (raschig rings); use since Sept. 20, '37 (carbon bricks).

416,218. Viscosity Oil Co., Chicago, Ill.; Feb. 18, '39; for lubricating and penetrating oils; use since Jan., '20.

416,301. Warwick Chemical Co., West Warwick, R. I.; Feb. 21, '39; for compound for softening textile fabrics and leather; use since Feb. 10, '39.

416,397. Ault & Wiborg Corp., Cincinnati, O. and N. Y. City; Feb. 25, '39; for ready-mixed paints, varnishes, and paint enamels; use since Feb. 7, '39.

416,489. Union Oil Co. of California, Los Angeles, Calif.; Feb. 27, '39; for automobile, furniture, and floor-polishing waxes, and self-polishing wax; use since June 8, '33.

416,490. Union Oil Co. of California, Los Angeles, Calif.; Feb. 27, '39; for metal polish; use since Sept. 1, '31.

416,549. The Diversey Corp., Chicago, Ill.; Mar. 1, '39; for powdered cleanser having incidental water-softening properties, for cleaning containers; use since Jan. 11, '39.

416,598. Benj. C. Betner Co., Devon, Pa.; Mar. 2, '39; for moistureproof, lacquer-coated paper bags; use since Feb. 15, '39.

416,646. Eastman Kodak Co., Rochester, N. Y.; Mar. 3, '39; for organic chemicals; use since May 18, '38.

416,708. Standard Lime and Stone Co., Baltimore, Md.; Mar. 4, '39; for metallurgical flux; use since Oct. 18, '35.

416,547. Continental Optical Co., Inc., Indianapolis, Ind.; Mar. 1, '39; for lenses tinted to reduce glare; use since Jan. 25, '39.

416,727. The Haloid Co., Rochester, N. Y.; Mar. 6, '39; for chemical photographic developer; use since Jan. 20, '39.

416,771. National Graphite Co., N. Y. City; Mar. 7, '39; for supplementary lubricating oils; use since Aug. 15, '38.

416,779. Society of Chemical Industry in Basle, Basel, Switzerland; Mar. 7, '39; for leather pigment finishing colors; use since June 25, '32.

416,788. Darco Corp., Wilmington, Del.; Mar. 9, '39; for adsorptive and decolorizing carbon; use since Jan. 20, '39.

416,806. W. H. Loomis Talc Corp., Gouverneur, N. Y.; Mar. 8, '39; for prepared insecticide, and inert carrier for insecticides and fungicides; use since Jan. 20, '39.

416,882. Vanadium-Alloys Steel Co., Latrobe, Pa.; Mar. 9, '39; for non-ferrous metal alloy and welding bodies made of the same, for providing metal objects with a hard, wear-resistant, and non-corrosive facing, or surface; use since Feb. 16, '39.

416,889. Catomance, Ltd., Welwyn Garden City, England; Mar. 10, '39; for waterproofing compounds for textile goods; use since '36.

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†Trade-marks reproduced and described cover those appearing in the *U. S. Patent Gazettes*, May 9 to May 23, inclusive; also May 30, Class 1. See also next page.

ADVERTISING PAGES REMOVED

New Trade Marks of the Month

JAPEX
416,908

E-Z-OUT
416,952

KARBATE
416,965

SUPER INSUBESTOS
417,038

UNIBESTOS
417,039

SUPER UNIBESTOS
417,040

DIHYDROLIN
417,109

FLORLUX
417,137

LUXKOTE
417,138

DURMAR
417,151

DISPERSOID
417,179

PANCO

417,181

Renown
417,204

TIRE LIFE
417,206

PYROTAK
417,291

CHURCH & CO'S
417,324

DWIGHT'S
417,326

MEDOL
417,348

MEDONA
417,349

VAPONA
417,350

POLYFORM
417,362

METALANE
417,382

FOUR 2222 DUCES
417,395

SURFIDE
417,508

SURFIDE
417,509

AHCO-PEL
417,521

FLO-BRITE
417,608

417,616

COLOR-TONE
417,632

BUTYL EIGHT
417,671

FLUOREX
417,876

D and A
418,354

Seagram

404,863

GARSPAR
416,322

CODITE
418,152

H. E. B.
416,944

CHROMOTEX
415,518

DISHADU
416,916

EMULSO
415,912

TARLENE
417,084

(Trade Mark Descriptions Continued)

416,908. Lethelin Products Co., Inc., Woodridge, N. J.; Mar. 10, '39; for insecticide or plant spray for killing Japanese beetles, and for the control of caterpillars and beetles attacking shade trees, ornamental plants, and the like; use since Jan. 10, '39.

416,952. Effervescent Products, Ltd., Chicago, Ill.; Mar. 11, '39; for fire-extinguishing compound; use since Oct. 14, '38.

416,965. National Carbon Co., Inc., N. Y. City; Mar. 11, '39; for carbon and graphite products for construction purposes in chemical engineering; use since Jan. 25, '39.

417,038. Union Asbestos & Rubber Co., Cicero, Ill.; Mar. 13, '39; for woven insulating blankets of glass wool fibers, utilized for insulating steam turbines and the like; use since Sept. 5, '33.

417,039. Union Asbestos & Rubber Co., Cicero, Ill.; Mar. 13, '39; for rigid insulating blocks and half tubular members comprising amphibole fibers and a suitable binder, utilized for insulating curved and flat surfaces; use since Oct. 14, '36.

417,040. Union Asbestos & Rubber Co., Cicero, Ill.; Mar. 13, '39; for rigid insulating material, comprising half tubular members and flat blocks of high temperature resisting fibers and suitable binders, for insulating curved and flat surfaces; use since Aug. 19, '36.

417,109. Whitmire Research Corp., St. Louis, Mo.; Mar. 15, '39; for insecticidal concentrates; use since Feb. 15, '39.

417,137-8. Patterson-Sargent Co., Cleveland, O.; Mar. 16, '39; for dry and ready-mixed paints, paint enamels, lacquers, and varnishes; use since Feb. 28, '38.

417,151. Vermont Marble Co., Proctor, Vt.; Mar. 16, '39, for marble provided with a water-proof finish; use since Mar. 6, '39.

417,179. The Milwhite Co., Inc., Houston, Tex.; Mar. 17, '39; for chemical mud-thinner; use since June 17, '38.

417,181. Panther Oil & Grease Mfg. Co., Fort Worth, Tex.; Mar. 17, '39; for lubricating oils and greases; use since Jan. 20, '23.

417,204. H. B. Davis Co. (Maryland Paint Co.), Baltimore, Md.; Mar. 18, '39; for dry and ready-mixed paints, paint enamels, lacquers, and varnishes; use since Feb. 23, '39.

417,206. Hyman E. Engert (Victor Patch) Chicago, Ill.; Mar. 18, '39; for patches for tires and rubber solvent used therewith; use since Sept. 1, '39.

417,291. McLaurin-Jones Co., Brookfield, Mass.; Mar. 20, '39; for gummed fabric and gummed fabric tape; use since June 30, '38.

417,324-5. Church & Dwight Co., Inc., N. Y. City; Mar. 21, '39; for bicarbonate of soda, saleratus, and for baking-soda for use as an ingredient in the preparation of foods; use since 1874. Under 10-year proviso.

417,326-7. Church & Dwight Co., Inc., N. Y. City; Mar. 21, '39; for bicarbonate of soda, saleratus, and for baking-soda for use in the preparation of foods; use since 1876. Under 10-year proviso.

417,348-9-50. Shell Oil Co., San Francisco, Calif.; Mar. 21, '39; for insecticidal preparations; use since May 1, '38.

417,362. Du Pont, Wilmington, Del.; Mar. 22, '39; for dyes and dyestuffs; use since Feb. 28, '39.

417,382. Monarch Metal Weatherstrip Corp., St. Louis, Mo.; Mar. 22, '39; for metal—namely, oxidized aluminum in strip form; use since June 22, '36.

417,395. Bennett Chemical Co., Cambridge, Md.; Mar. 23, '39; for automobile polish and glaze; use since Feb. 24, '39.

417,508. Standard Oil Co. of Calif., Wilmington, Del., and San Francisco, Calif.; Mar. 25, '39; for materials for chemically treated metallic surfaces to produce an etched or pitted condition, or a film, thereon; use since Mar. 2, '39.

417,509. Standard Oil Co. of Calif., Wilmington, Del. and San Francisco, Calif.; Mar. 25, '39; for ferrous metal castings; use since Mar. 2, '39.

417,521. Arnold, Hoffman & Co., Inc., Providence, R. I.; Mar. 27, '39; for chemicals used as water-repellants; use since Jan., '39.

417,608. Floridin Co., Warren, Pa.; Mar. 29, '39; for agent prepared from natural earth and useful for the decolorizing or reclaiming of oils or cleaning solvents; use since Mar. 21, '39.

417,616. Hecker Products Corp., N. Y. City; Mar. 29, '39; for shoe soap; use since Feb. 10, '39.

417,632. Western Auto Supply Co. (Western Auto Stores, and Western Auto Supply Co.), Kansas City, Mo.; Mar. 29, '39; for paint in dry form; use since Feb. 21, '39.

417,671. R. T. Vanderbilt Co., Inc., N. Y. City; Mar. 30, '39; for mixture of accelerators capable of effecting vulcanization of rubber in the manufacture of rubber products; use since Apr. 5, '38.

417,876. International Filter Co., Chicago, Ill.; Apr. 5, '39; for water purifying materials, in particular, tricalcium phosphate; use since Mar. 16, '39.

418,354. National Broom Mfg. Co., Pueblo, Colo.; Apr. 17, '39; for insecticides; use since Jan. 1, '39.

404,863. Bartholomew F. Natoli (Seagram Chemical Co.), Passaic, N. J.; Apr. 4, '38; for metal polish and silver polish; use since Nov. 1, '37.

416,322. Garco Products, Inc., Butler, Pa.; Feb. 23, '39; for comminuted material embodying silicates; use since Jan. 5, '39.

418,152. I. R. L., Inc., N. Y. City; Apr. 12, '39; for detergent compounds adapted for washing glassware, crockery, painted surfaces, textile fabrics, and vehicles; use since Apr. 10, '39.

416,944. H. E. Butt Grocery Co., Harlingen and Corpus Christi, Tex.; Mar. 11, '39; for soap chips and a general cleanser for household use; use since Feb. 23, '39.

415,518. Mathieson Alkali Works, Inc., N. Y. City; Feb. 2, '39; for preparation in powder form for cleaning, renovating, and refinishing new and soiled rugs and carpets; use since Jan. 21, '39.

416,916. John B. Rosefield (An-Fo Mfg. Co.), Oakland, Calif.; Mar. 10, '39; for dishwashing preparation; use since Feb. 15, '39.

415,912. Rochester Germicide Co., Rochester, N. Y.; Feb. 10, '39; for liquid soap for use on floors, woodwork, automobile bodies, and the like; use since Mar., '22.

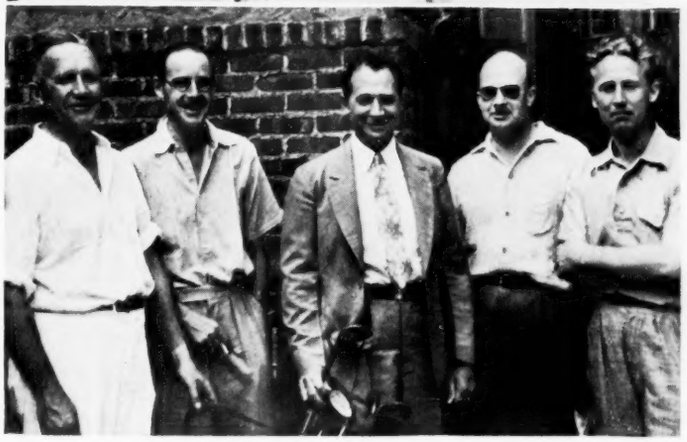
417,084. The Curran Corp., Malden, Mass.; Mar. 15, '39; for liquid cleaning preparation and solvent for removing tar or grease spots from painted or metal surfaces such as automobile bodies and the like, and from textile fabrics; use since June, '32.

The Salesmen's Association at Ridgewood

At the left, Harold B. Prior, president, Prior Chemical, Harry Smith, president, George Chemical, and "Charlie" Frost, Prior Chemical. Right, the master of ceremonies, "Bart" Sheehan, Du Pont, and chairman of the Salesmen's entertainment committee.

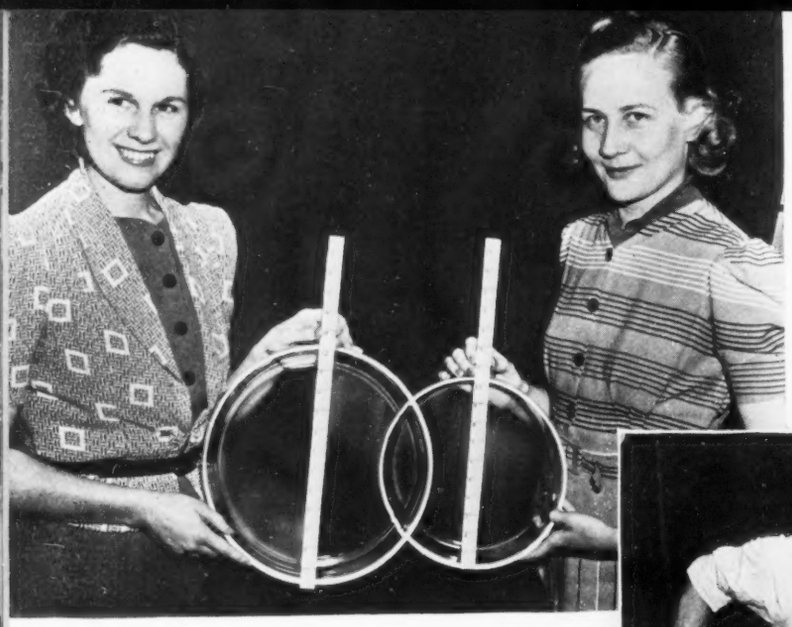
Above, A. Leith, Jr., Dow Chemical, A. H. Mathieu, president, A. H. Mathieu & Co., and Herbert R. Prior, vice-president, Prior Chemical.

Below, reading left to right, "Joe" Holywood, "Al" Higgins, and "Ed" Burke. Higgins is with Zinsser & Co., Holywood and Burke with Edward S. Burke Co.



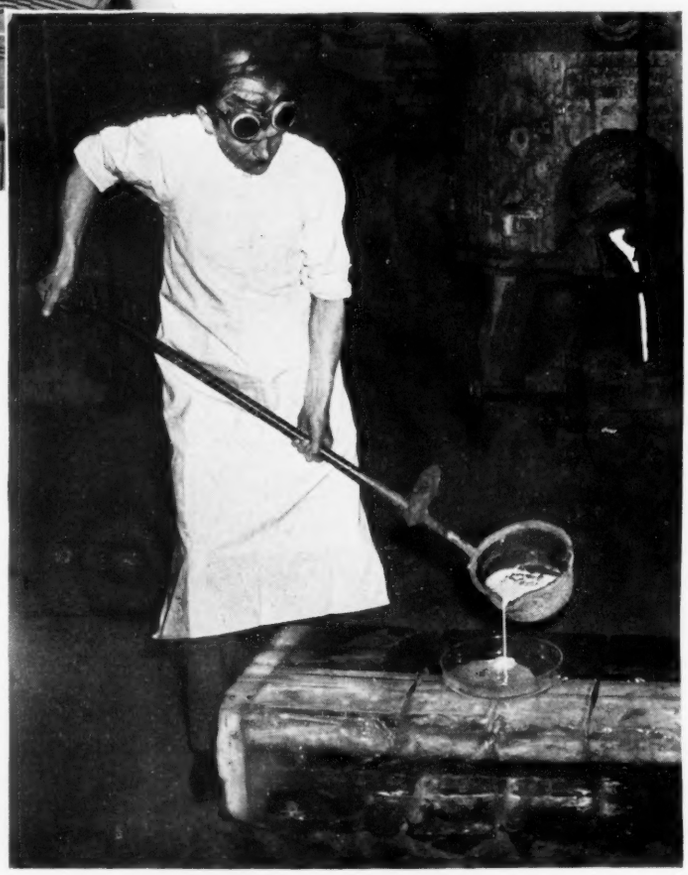
Above, T. W. Sill, assistant manager of sales, in charge of intermediates, Monsanto, "Clint" Brown, Franco-American, "Vic" (Victor E.) Williams, assistant general manager, Monsanto, Cecil Rice, W. J. Bush & Co., and "Al" (A. T.) Loeffler, manager, N. Y. Branch, Monsanto.

Reading upwards are: Donald Prior, son of H. R. Prior, and a "dyed-in-the-wool" camera addict, "Ed" Maguire, Du Pont, "Tom" Major, Bakelite's "P.A.", Rodger Meister, Jr., Michigan Alkali, and Frank Fanning, N. I. Malmstrom & Co. Frank did "yeoman" work on the arrangements.



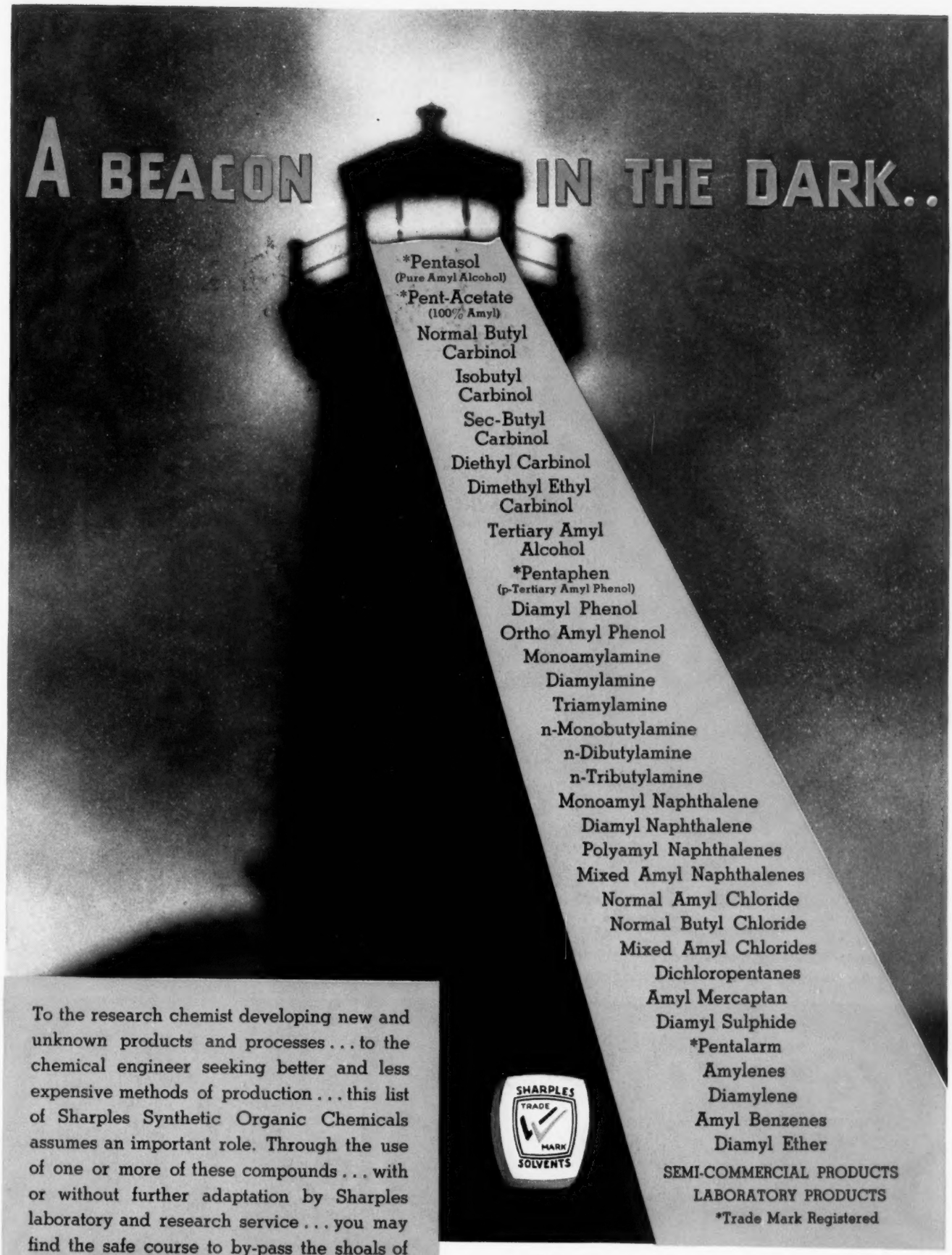
Corning's New Glass

The new low-expansion glass shrinks during the manufacturing process. Research scientists were amazed to find this strange occurrence and were more amazed to find that the resultant product was the ultimate example of low-expansion glass that has ever been achieved. Ware shown was 12" in diameter when it came from the preliminary molding operation. After going through the new process, it had shrunk to 10½" in diameter.



Before going through the new process which Corning research scientists have discovered, the new ultra-low-expansion glass is no more resistant to thermal shock than any ordinary glass. After the process, it is practically impossible to break it by temperature change. Here Dr. Martin E. Nordberg of the Corning Glass Works Research Laboratory is pouring molten iron at 2600° F. into a piece of ware set on a cake of ice. Five minutes later the glass had settled several inches into the ice.

Although the chemical lore of most visitors to The B. F. Goodrich Co. World's Fair building embraces only the fact that water can be designated as "H_2O", many of the more than a million persons who have viewed the exhibits have greatly broadened their knowledge of the geography and mechanics of chemistry through studying the laboratory and compounding display. Shown on the large illuminated map are the points of origin of almost 50 chemicals, metals, textiles and rubber used by the company.



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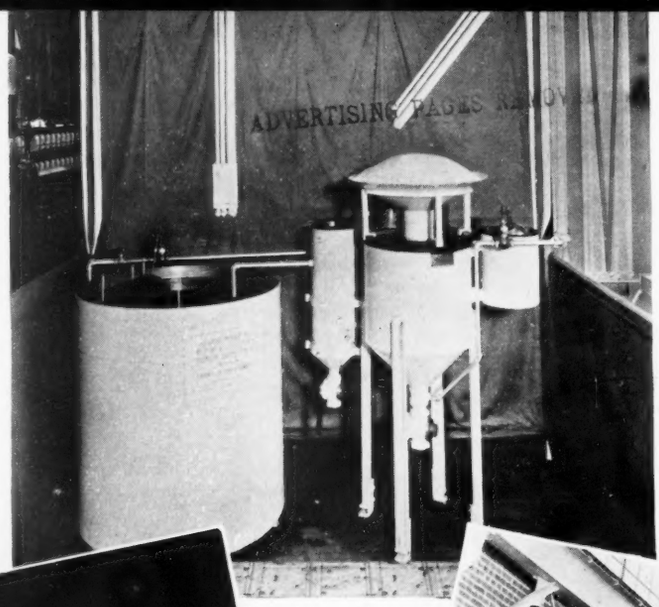
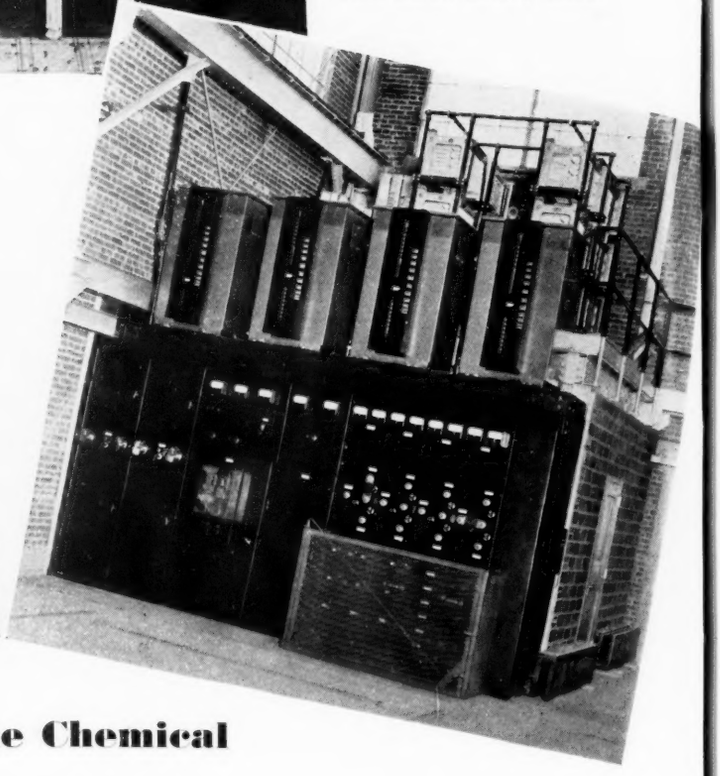
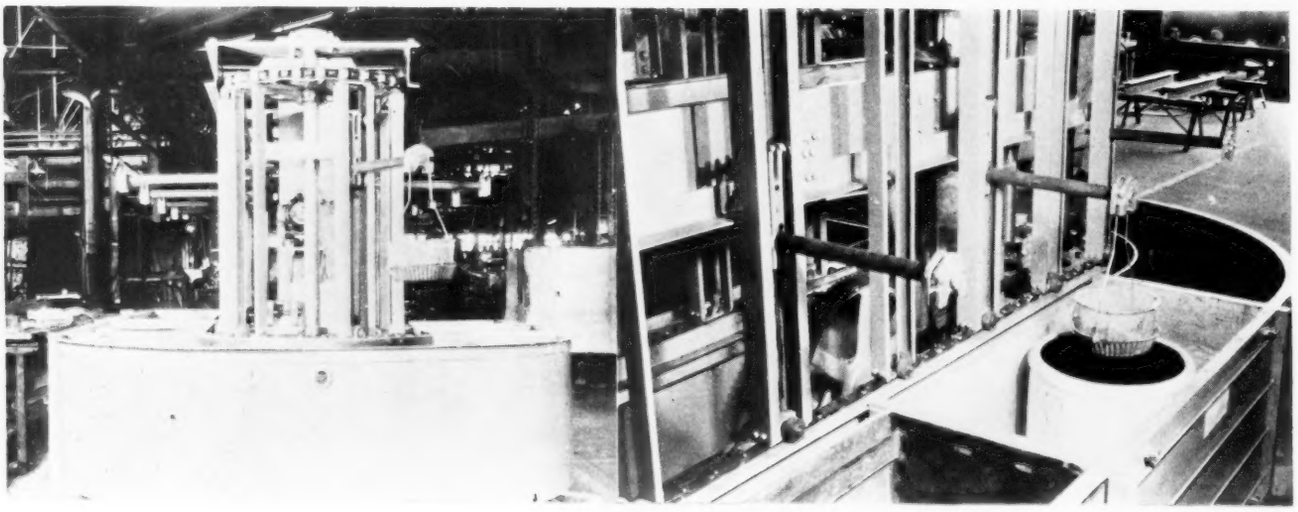


To the right, the new salt brine percolator developed by the Myles Salt Co., Ltd., New Orleans, La. Below at the left, the new double arm vacuum mixer with a new single packing gland construction—a development for the manufacturers of paints, inks, chemicals, flush colors, plastics, phenol resins, urea resins, etc. Operates under high vacuum to enable the evaporation of moisture or solvents from materials mixed at temperatures below their atmospheric boiling points. Possibly the most flexible, most complete source of welding power is this Westinghouse welding laboratory installed for the Linde Air Products Company at Niagara Falls shown directly below.



New in the Chemical Equipment Field

Automatic Plating Conveyor: Hanson-Van Winkle-Munning's latest contribution to the plating field. Left, end view of a bright dip conveyor. Basket is being transferred and about to be lowered. Right, side view. Carriers being lifted by the elevator.



News Review of the Month

RUMFORD CHEMICAL 85-YEARS OLD

Big List of Celebrities Attend Celebration June 23—Rumford Museum Dedicated—Company's Interesting History Reviewed By President A. E. Marshall—Count Rumford "Returns" For a Day to Witness His Statue Unveiled—

TO "the kitchen-capital of the U. S." trouped nearly 300 guests of the Rumford Chemical Works on June 23 to celebrate 80 years of baking powder history. In the past 8 decades Rumford citizens have given the world a total of 500,000,000 pounds—enough to supply every man, woman, and child in the U. S. with two biscuits a day for 6 months.

Statistics at best, however, make for dry reading. Guests at the "fiesta," epicureans all, at least for a day, with appetites sharpened first by cocktails and clams and salt air blowing in from Narragansett Bay, then wonderfully appeased with such delicacies as Baby Quahaug Stew, Lobster New England, Fried Rhode Island Reds, Block Island Swordfish Steaks, Rumford Breads and Wuttatash (frozen rum punch) were when coffee time arrived in complete accord with Count Rumford's following words of wisdom uttered many, many years ago:—

"In what art or science other than cooking could improvements be made that would more powerfully contribute to increase the comforts and enjoyments of mankind?"

Early Chemical Equipment

Highlights of the Rumford Chemical Works' celebration were the dedication of the Rumford Museum, in which will be established a collection of early chemical and industrial equipment, and the unveiling of the bust of Count Rumford. A. E. Marshall, president of the company presided as chairman during the ceremonies.

Guests and visitors were first taken through the modern baking powder plant. Starting on the top floor, the groups saw the control and research laboratories of the organization. Then, proceeding downward, floor by floor, they followed the manufacture of the powder from the point where its ingredients are stored in huge bins, through the stages in which it is mixed and blended, packaged, labeled, and made ready for shipment. A visit to the can manufacturing department completed the tour.

The museum was then dedicated by Henry M. Wriston, president of Brown University. In this ceremony, the carbon dioxide generating power of baking powder was demonstrated. Placing a teaspoonful of the powder in water, the gas displaced water, which in turn caused a can to ascend a tall glass tube. On reaching the top of the tube, the can closed an electrical circuit, starting the mechanism which officially opened the door of the museum.

The unveiling of the bust of Count Rumford followed. Speakers at the unveiling were: Mr. Marshall, Arthur H. Linscott, president of the Rumford Historical Association; Mlle. Suzanne Silvercruys, sculptress of the bust; representatives of the Rumford company employees; and Theodore Sweet, New England divisional manager of the company, who impersonated Count Rumford. After the unveiling the company played host to the gathering at an anniversary dinner in the Squantum Association clubhouse, situated on the shore of Narragansett Bay. Among the invited guests at the dinner were William H. Vanderbilt, governor of Rhode Island, and John F. Collins, mayor of Providence.

The Rumford Chemical Works had its inception in 1854, when George F. Wilson and Professor Eben Horsford entered into a partnership for the manufacture of chemicals in Pleasant Valley, R. I. Within the next 4 years the partnership had been incorporated and adopted the name of Rumford Chemical Works. The name of the company was derived from the Rumford Chair of the Application of Science to the Useful Arts, which Professor Horsford had occupied at Harvard. The chair, in turn, had been so named in commemoration of Count Rumford, the title bestowed upon Benjamin Thompson by the Holy Roman Empire, for his achievements in scientific diet and culinary improvement.

During this period the company also purchased a large tract of land in what was then Seekonk, Mass., and had erected its first building, now the home of the museum. In 1861, upon the readjustment

BAKING POWDER OPENS RUMFORD MUSEUM DOORS

A spoonful of baking powder poured into water caused the same gas which makes dough rise to lift an empty baking powder can to the top of a glass tube. At the top it made an electrical connection, and the doors swung open. L. to R.: Henry M. Wriston, president of Brown University; A. E. Marshall, president, Rumford Chemical Works. Other pictures will appear in August "Roto."

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Names of the Month

of the State boundary, Seekonk became a part of Rhode Island.

In 1859, "Professor Horsford's Baking Powder" was first produced. This item soon became the most important of the firm's products, and necessitated several expansions of the Rumford plant within the next 5 years. In 1861 the company started the production of ammoniated superphosphate of lime in a new plant having access to the Seekonk River, to facilitate haulage of raw materials and subsequently also transferred the production of crude phosphoric acid from the Rumford plant to this "Riverside Works." Transportation facilities shortly afterward also forced the company to move its baking powder production into Providence, where a four-story building on Water street was occupied. Soon after moving the production to this site, box-making and printing machinery was installed for the manufacture of the company's needs.

Until 1927 the blending and packing of baking powders was carried out in Providence, but with the decision to concentrate all manufacturing activities at Rumford, where the chemical units of the company had been operating throughout the period, construction of a modern 5-story building solely for baking powder production, was undertaken. This building is the apex of what is now a beautifully landscaped industrial plant. In March of this year the company last expanded when it placed into operation a new plant for the manufacture of sodium tetraphosphate.

Exposition's 25th Anniversary

New chemical products and materials of construction with examples of their latest applications will make the 17th Exposition of Chemical Industries more interesting than all of its predecessors. Members of the Advisory Committee of the Exposition have just been announced. Committee will be headed by Dr. M. C. Whitaker, vice-president of American Cyanamid.

Exposition will be held at Grand Central Palace, N. Y. City, Dec. 4 to 9, '39, marking the 25th year of its service to the chemical and allied industries. The story of modern metals will be told in terms of their applications in all fields of manufacturing industry with especial emphasis on the uses of stainless steel, nickel and chromium clad steel, and the nonferrous metals and alloys. Exhibit space devoted to displays of modern plastics will be greatly increased this year and the Exposition will provide one of the best means for examining the total advance of this art and witnessing the complete range of its applications.

Three floors of Grand Central Palace have been reserved for the 17th Exposition of Chemical Industries and already more than 250 exhibitors have contracted for space. The exhibits of containers and packaging machinery will constitute a comprehensive coverage for this field. Other exhibit classifications represented will be chemicals and chemical products, laboratory equipment and supplies, instruments of precision, materials handling equipment, brewing, distilling and bottling equipment, industrial chemical equipment and machinery.

Exports, Imports Rise

Exports of chemicals and related products were valued at $15,000,000 in May. In April, shipments were valued at $14,600,000; compared with May, '38, when exports totaled $13,204,000, the like month of this year has recorded a gain in valuation of about 15%. Practically all items, sulfur excepted, showed substantial increases in the May lists. Fertilizer exports, valued at $1,986,500, were 50% greater this May than last. The sharp increase was due to an approximately 400% rise in potash materials requirements of foreign countries; in May, '38, only 4,437 tons of potash fertilizer were exported, but 22,166 tons were required during this May, the bulk (over 18,000 tons) being taken by Japan.

Receipts of chemicals in May were valued at $15,000,000—practically identical with exports in this same month. April imports were substantially above the May level, as $19,000,000 worth were recorded in the former month. In May of '38, however, only $11,400,000 worth were listed. Except for coal-tar products, all leading items gained in the May period, compared with the like '38 month.

Data on Trade Pacts

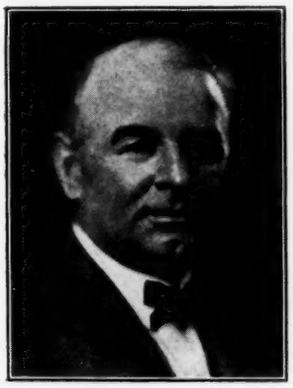
U. S. Tariff Commission has just completed the last of 4 volumes comprising digests of trade data on products for which concessions were granted in the new trade agreement with Canada. This last work is a history and analytical summary of our trade with Canada during recent years. Copies of the material may be had from the Tariff Commission at Washington, D. C., or at its N. Y. City office in the Custom House.

Industrial Relations

The 22nd Annual Conference on Industrial Relations will be held Aug. 30- Sept. 2 at Silver Bay (Lake George), N. Y. The meeting, sponsored by the National Council of Y. M. C. A.'s will review employer-employee relations in the heavy industries.

The Story of Copper

Some of the characteristics and manifold uses of copper are set forth in the July issue of *Priorities*, published by Prior Chemical Corp., N. Y. City. The story sets forth the parts played by copper in a transcontinental telephone order for chemicals, including manufacture, shipment, and payment. The various alloys of copper are discussed.



PETER C. REILLY

OTHO EVANS LANE

PAUL MAHLER

ALAN VALENTINE

P. C. Reilly, president, Reilly Tar & Chemical, received the degree of Doctor of Laws from Notre Dame on June 4; Otho Evans Lane, Philadelphia insurance executive, now on Penn Salt's board; Paul Mahler, now general manager for Stroock & Wittenberg; Alan Valentine, 38-year old president of the University of Rochester and well-versed in current sociological and economic problems, who is now a Freeport Sulphur Company board director.

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Heavy Chemicals

June Volume Shows Seasonal Decline

Outlook For Summer Months Appears Brighter—Light Aluminum Hydrate Up 1c—Silver Cyanide Prices Withdrawn—Alkalies Steady—Increased Demand For Chlorine—

DEMAND for industrial chemicals in the past month was spotty with some days featured by heavy volume while others were quite dull. Nevertheless, the month's total was far in excess of the figures for the corresponding month of last year and compared favorably with May of this year. The usual "summer dullness" promises to be less noticeable. Consuming industries, with but few exceptions, seem likely to maintain fairly satisfactory production schedules over the next few months. The highly unsettled situation abroad, however, is responsible for a considerable amount of hesitancy and buyers are not anxious to increase inventory stocks.

Important Price Changes

	June 30	May 31
ADVANCED		
Aluminum hydrate, light, bgs.	$0.12	$0.11
Fluorspar, 85% washed gravel	18.00	17.00
Manganese chloride	.08¼	.07¾
DECLINED		
Antimony, oxide	$0.10	$0.11
Copper chloride, cryst	.12½	.13

Few Price Changes

Price changes were relatively few. Quotations for light aluminum hydrate were advanced 1c on July 1. The new schedule is 12c for bags, carlots, with a ½c differential for barrel packing. Copper chloride, crystals, was reduced ½c to a basis of 12½c-13½c. The decline was caused by the earlier reduction in the metal. Other copper salts reduced previously were steady at unchanged levels. A ¾c advance featured manganese chloride and the new price is 8¼-8¾c, depending upon quantity. The higher tariff on German materials was held responsible for the rise. Antimony metal held steady at 12c in the past 30 days, but the oxide was reduced 1c by at least one supplier to a basis of 10c.

The sudden action on silver prices on the part of the U. S. Treasury forced producers of silver cyanide to withdraw all quotations, and for the time being at least, suppliers will list the price daily. The pronounced weakness in acetic showed no signs of changing in the near future. The situation in sodium silicofluoride is still highly competitive between domestic and imported material.

Highly encouraging was the demand for items that may be classed as being somewhat seasonal. The movement of calcium chloride for dust-laying purposes is at a peak, the same situation is true of chlorine for water purification and sewage disposal purposes. A much steadier price tone is in evidence. The volume of anhydrous ammonia is very satisfactory.

Alkali shipments in the past month were below May's total, but were considerably ahead of the volume for May a year ago. The rayon producers continue to take satisfactory quantities and the outlook over the balance of the year in this direction is very encouraging. A somewhat steadier price tone was indicated for caustic, particularly l.c.l. quantities. Bichromates were in steady demand during the period under review with the color makers taking appreciable quantities. The movement of cyanides and other plating chemicals was well below May's volume caused by the curtailment of automotive production activity. Further declines in automobile output are expected in July and the first part of August. From that point on, however, a quick recovery is expected in view of the earlier introduction of '40 models this year.

No important price changes were announced at the mid-year for existing contracts. This was no great surprise to buyers and there was little or no hesitancy displayed that could be attributed to this factor.

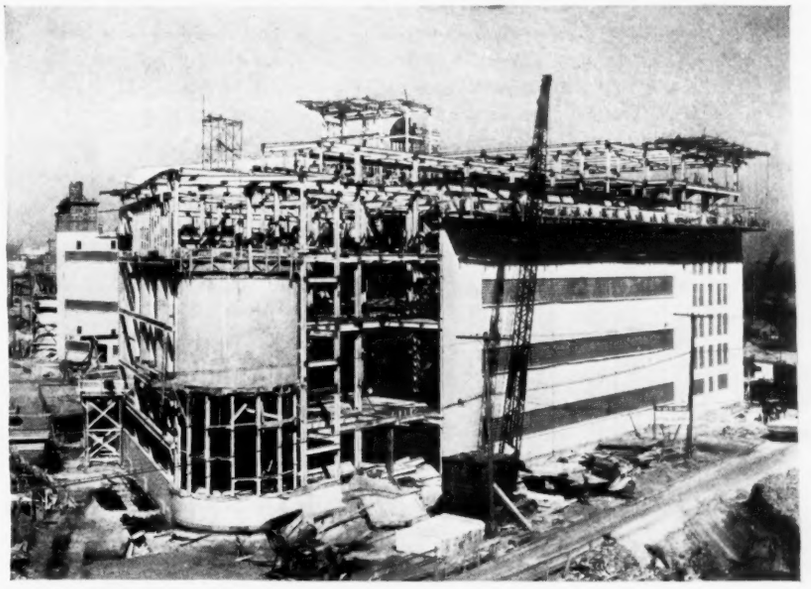
The sudden and extremely sharp recovery in business activity in June was unexpected but highly pleasing news and provides an optimistic note for the summer period and the balance of the year. It now seems likely that the textile field will show definite improvement instead of further curtailment. At the moment it is difficult to say just what the trend in steel will be over the next two months, but the consensus of opinion is that there will be a slight drop followed by recovery early in August when the automobile companies start to re-enter the market in a large way.

No War in '39?

Despite the complications in the foreign situation, the majority of economists and professional forecasters still hold to their earlier statements that there will be no war this year. Further, they all seem to be pretty much in agreement that there should be a steady increase in the volume of business over the balance of 1939.

Mutual Chemical Wins

Mutual Chemical Co. of America has received from the U. S. Circuit Court, Baltimore, a decision enjoining both the City and State from enforcing the airport zoning law, as it pertained to Mutual's waterfront plant in Baltimore. Bill would restrict the height of buildings adjacent to the airport.



Church & Dwight's new baking soda plant, at Syracuse, N. Y., being erected by The Austin Co., Cleveland, nears completion. Steel has been electrically welded and plant will be air-conditioned.

New Sulfur Producer?

It is reported that a sulfur refinery is being planned for southern California, to be located at, or near, San Diego. Parties developing a sulfur deposit just below the international border are said to be interested in buying or leasing tide-lands either at San Diego or Calexico.

Diamond's New Product

Diamond Alkali, Pittsburgh, now manufactures ferric chloride at its Painesville, O., works.

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Fine Chemicals

Mercury Prices Advanced Sharply

Foreign Metal Advanced to $78 in Bond—Silver Nitrate Prices Decline—Vanillin Advanced 40c—Cream of Tartar Competitive—Better Demand for Citric, Tartaric Acids—

THE recent action of the Senate attempting to end the power of the president to control the gold content of the dollar had far-reaching effect on the price on silver, for tied up with the Senate move was an attempt to raise the price the government must pay for domestic mined silver plus an attempt to stop federal purchase of foreign mined metal.

This rather strange situation was, of course, the result of a temporary alliance between the senators opposed to President Roosevelt and the senators from the so-called "silver states." The practical reaction chemically was a radical reduction in the quotation for silver nitrate. Very timely and of definite practical value is the article "Silver As A Raw Material," by Robert Leach, vice-president of Handy & Harman, appearing in this issue.

Mercury Advances

Mercury prices are again moving upwards. At the month-end, foreign metal was quoted at $78 per flask in bond, equivalent to about $97.50 duty paid. Domestic metal was held at $88-$90. According to reports, considerable volume of business was placed for domestic quicksilver in the past 30 days. Stocks of domestic material are said to be plentiful and apparently for the time being domestic producers are not advancing prices as rapidly as foreign suppliers. Mercurials remained unchanged in price.

The severe competition in vanillin seems ended. A sharp increase, 40c, was placed in effect in the middle of the month and quotations now range between $2.60 and $2.50 per lb. Higher prices were reported for lycopodium, caused, it is reported, by a shortage of stocks at primary points. Santonin was another item quoted higher, the advance amounting to $1 per lb.

Despite the great strength in tartaric acid and most of the tartars, competition between makers of cream of tartar brought about a ½c decline. Powder or granular material is now quoted at 22¼c per lb., in 5,000-lb. lots, one shipment, with smaller quantities quoted at 22¾c. A seasonal improvement in consumption of tartaric acid and citric acid was in evidence.

Two important bismuth salts were reduced in price last month although no change was made in the metal. The subcarbonate in drums is now quoted at $1.43-$1.46 and the subnitrate at $1.23-$1.26. Competition between makers was the reason assigned for this move.

Important Price Changes

ADVANCED

	June 30	May 31
Lycopodium	$1.20	$1.15
Mercury, foreign, bond	78.00	66.00
dom.	88.00	85.00
Santonin	23.00	22.00
Vanillin, ex-eugenol	2.60	2.20
ex-guaiacol	2.50	2.10
ex-lignin	2.50	2.10

DECLINED

Bismuth subcarbonate, drs.	$1.43	$1.53
subnitrate, drs.	1.23	1.33
Cream of tartar	.22¼	.22¾
Phenobarbital	3.60	4.00
Silver nitrate	.24⅜	.31½

The volume of business in fine chemicals, pharmaceuticals, aromatic chemicals and essential oils was slightly below May, but well ahead of the figures for the corresponding month a year ago. Keen competition existed in the market for many of the essential oils. The markets for most of the important aromatics held firm and unchanged during the period under review. Higher prices were announced for ethyl vanillin.

Huisking With Fritzsche

Joseph A. Huisking, connected with Charles L. Huisking & Co., Inc., for many years has become associated with Fritzsche Bros., Inc., according to an announcement by F. H. Leonhardt, president of the essential oil organization. Mr. Huiskings' former connection with Charles L. Huisking & Co., Inc., terminated June 15. After a brief vacation he assumed his new duties with Fritzsche Bros., Inc., July 1.

Heyden Men Golf

Garfield (N. J.) plant, Heyden Chemical Corp., N. Y. City, won the company's golf trophy June 3, at Metuchen Golf Club, Metuchen, N. J., where the annual tournament was held. Dr. Aalto, Heyden's research labs., was low scorer.

Now a Division

The Wood Ridge Manufacturing Co., Wood Ridge, N. J., is now the Wood Ridge Manufacturing Division of F. W. Berk & Co., N. Y. City. Company manufactures drugs and fine chemicals, specializing in mercurials.

Endo To Move

Endo Products, Inc., manufacturer of pharmaceuticals, has purchased a modern 4-story plant at Richmond Hill, L. I., N. Y. City. After alterations have been completed, company will move from present address, 395 4th ave., N. Y. City, to the new location. A sales office will be maintained at the present address.

Cartel's Sales Agent

Roura & Forgas, London, England, have been reappointed as sole agents for Mercurio Europeo, Spanish-Italian mercury cartel, which has been reconstituted.

Schering Plans Expansion

Schering Corporation, whose present plant is in Bloomfield, N. J., has started preliminary work on establishment of a new manufacturing, research and administrative center on a 21-acre tract it purchased last fall in Union Township, N. J.

Advertisers To Meet

A national conference, which will benefit every branch of industry, is being planned by the National Industrial Advertisers' Association, to be held in N. Y. City, September 20, 21 and 22, at the Hotel New Yorker, under the sponsorship of the Technical Publicity Association of N. Y. and the Industrial Marketers of New Jersey.

"The 1939 N.I.A.A. National Conference is being definitely planned to stimulate business in the marketing field," states Edward A. Phoenix, of Johns-Manville and chairman of the General Conference Committee. "Executives and advertising men representing hundreds of American and Canadian industries will attend in order to learn of practical methods of improving their companies' sales and sales promotion work. Throughout the Conference, stress will be laid on industrial marketing."

COMING EVENTS

Salesmen's Association of the American Chemical Industry, Golf Meet, Plandome Golf Course, Plandome, Long Island, July 11.
American Ceramic Society, General Meeting, St. Francis Hotel, San Francisco, Calif., Aug. 6-12.
Salesmen's Association of the American Chemical Industry, Golf Tournament, Bonnie Briar Country Club, Larchmont, N. Y., Aug. 15.
American Pharmaceutical Ass'n, 87th Annual Convention, Biltmore Hotel, Atlanta, Ga., August 20-26.
American Mining Congress, Sixth Annual Metal Mining Convention & Exposition, Western Division, Salt Lake City, Utah, Aug. 28-31.
Electrochemical Society, Fall Convention, Hotel Commodore, N. Y. City, Sept. 11-13.
A. C. S., 98th Meeting, Boston, Mass., Sept. 11-15.
National Petroleum Association, Atlantic City, N. J., Hotel Traymore, Sept. 13-15.
American Association of Textile Chemists and Colorists. Annual Convention, Copley-Plaza Hotel, Boston, Mass., Sept. 15-16.
American Gas Association, Annual Convention, N. Y. City, Oct. 9-10.
National Safety Congress & Exposition, Atlantic City, N. J., Oct. 16-20.
American Public Health Association, William Penn Hotel, Pittsburgh, Pa., Oct. 17-20.
Porcelain Enamel Institute, 4th Annual Forum, Ohio State University, Columbus, O., Oct. 18-20.
National Pest Control Ass'n, 7th Annual Convention, Hotel Pennsylvania, New York City, Oct. 23-24-25.
National Paint, Varnish & Lacquer Association, Annual Convention, Hotel Fairmont, San Francisco, Oct. 31, Nov. 1-2.
American Petroleum Institute, 20th Annual Meeting, Stevens Hotel, Chicago, Nov. 13-17.
American Society of Mechanical Engineers, Philadelphia, Pa., Dec. 4-7.
17th Exposition of Chemical Industries, Grand Central Palace, N. Y. City, Dec. 4-9.
A. C. S., Eighth National Organic Chemistry Symposium, Division Organic Chemistry, St. Louis, Mo., Dec. 28-30.

Personnel

¶ Williamson Succeeds Teagle on American I. G. Board—Important Changes on Columbia Faculty—Abbiati, Monsanto Chemical Co. Promoted—Others in New Positions—

Hugh S. Williamson has been elected a member of the board of directors of the American I. G. and appointed a vice-president of the company. Mr. Williamson was elected to the directorship to fill the vacancy existing since the end of last year by the retirement of Walter C. Teagle, chairman of the board of the Standard of N. J.

Mr. Teagle's retirement from the American I. G. board was in furtherance of his plan of curtailment of his business activities.

For the last 10 years Mr. Williamson has been a partner in the law firm of Breed, Abbott & Morgan, in charge of litigation. He received his A.B. degree from Columbia in '22 and his LL.B. 3 years later.

Urey Succeeds Sherman

Dr. Harold C. Urey will serve as executive officer of Columbia's graduate department of chemistry for a term of 3 years. He succeeds Dr. Henry C. Sherman, who has headed the department for the past 20 years. Dr. Sherman will continue to serve in research and educational work.

Prof. J. Enrique Zanetti has been made director of laboratories at Columbia University. Office is new one, and is intended to supplement the work of the chemistry department's executive officer.

Among the members of the Columbia faculty to retire this year are Professors Marston Taylor Bogert, Ralph H. McKee, Daniel D. Jackson, and William S. Ayars, all of whom have been actively identified with the chemical industry for many years; with the exception of Dr. Bogert, of the Dept. of Chemistry, all are members of the faculty of Columbia's School of Engineering.

Abbiati Promoted

F. A. Abbiati, for 12 years active in sales and development work with Monsanto's Merrimac Division at Everett, Mass., has just been promoted to assistant general sales manager of company's Plastics Division. He will make his headquarters in Springfield (Mass.), where he will assist J. H. Clark, general manager of Monsanto plastics sales.

Promotions of the Month

John S. Henry is now sales manager for Joseph Turner & Co.'s heavy chemicals department. Mr. Henry has been with the Company for 9 years. Phillip Lo Bue has been appointed manager of its special products department.

Celanese Corp. has appointed Peter D. Cooper manager, and S. B. Roberts chief engineer, at its plant now being erected near Pearisburg, Va. Mr. Cooper, at one time in charge of cost accounting for British Celanese Ltd., has been with Celanese Corp. since 1924. Messrs. Roberts and Cooper were formerly located at company's Cumberland, Md., plant.

Kenneth A. Earhart assumes his duties June 15 as chief research chemist for the alkyd resin division, Stroock & Wittenberg Corp., N. Y. City. He was formerly in charge of research and production for Devoe & Raynolds' alkyd department.

Nicholas S. Willson, Grasselli Chemicals Department, Du Pont, has been transferred to the Charlotte, N. C. office where he will assume the duties of assistant to Howard J. Smith, district manager. Alexander Nyiro, Jr., formerly of the Wilmington office, has been transferred to N. Y. City to assume the duties formerly performed by Mr. Willson.

C. B. Shoemaker is now general manager of the Nitro, W. Va., plant of American Viscose; W. A. B. Vivian has been appointed plant engineer.

S. F. Youngstrom, formerly with Wilbur-Ellis Co., N. Y. City and San Francisco, is now with Garrigues, Stewart & Davies, 40 Rector st., N. Y. City.

Luke E. Sawyer, formerly assistant general superintendent of Babcock & Wilcox's plant at Beaver Falls (Pa.), has been appointed general superintendent there.

Dr. Felix Lauter has resigned as president of La-Bre Chemical Products Co., Wyandotte, Mich., and is now associated with Stroock & Wittenberg Corp., 30 E. 42 st., N. Y. City. He is well known in the synthetic resin field, having pioneered in the development of soluble ureas for surface coatings.

Melvin C. Molstad, for the past 8 years assistant professor of chemical engineering at Yale, has been appointed associate professor in charge of chemical engineering at the University of Pennsylvania.

Norman A. Evans has been appointed sales manager, Pressed Steel Tank Co., Milwaukee. Mr. Evans, formerly in charge of company's N. Y. City office, now makes his headquarters at Milwaukee.

Eric F. Kerry has been elected vice-president in charge of sales, Consumers Import Co., 342 Madison ave., N. Y. City. He has been doing sales promotional work for the company for some years.

Berry Bros., paint and varnish manufacturer of Detroit, elected Arthur Kiernan president last month.

Seldon G. Hait, Sr., is now a member of the sales staff, Kentucky Color & Chemical, Louisville, Ky. Mr. Hait, identified with the dry color industry for 40 years, will serve as special representative and will have his headquarters at company's Philadelphia office, 1120 Locust st.

HALE BRINGS CHEMURGY TO CANADA

Three speakers at the recent 22nd annual Canadian Chemical Association's convention examine paper made at the Herty Laboratory, Savannah. L. to R., Hon. D. G. McKenzie, Winnipeg, Dr. William J. Hale, and Dr. Robert Newman, Ottawa, a member of the National Research Council.

ADVERTISEMENT—*This entire page is a paid advertisement.* *Prepared Monthly by U. S. Industrial Chemicals, Inc.*

SOLVENT NEWS

Reg. U.S. Pat. Off.

July ★ A Monthly Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★ 1939

Solox and "Dry-Ice" Freeze Metal Parts For Expansion Fits

By utilizing the extremely low temperatures available with a mixture of Solox and "Dry-Ice,"* a new method for cold-shrinking metal parts for "expansion fits" eliminates both the expensive equipment and adverse chemical effects associated with previous Brine techniques.

"Dry-Ice"* is solid carbon dioxide at a temperature of —109°F. which, in subliming, absorbs approximately 247 B.T.U. per pound. Solox is U.S.I.'s proprietary alcohol-type solvent and is favored for this application not only because it remains liquid at the low temperatures but also because of its non-corrosive properties.

Lowers Temperature to —97°F.

A mixture of "Dry-Ice"* and Solox will produce a temperature of —97°F. which is considered suitable for shrinking internal parts larger than 9 or 10 inches in diameter. The part to be shrunk is immersed in the Solox and pieces of "Dry-Ice"* are added to keep the mixture "Boiling" (giving off carbon dioxide) until the part is sufficiently cooled to produce the maximum shrinkage.

Complete details of the method including shrinkage, cooling time and heat absorption tables, allowances and formulas for calculating Solox and "Dry-Ice"* required, are given in a special bulletin available without charge from U.S.I. Please ask for Bulletin No. 63.

*Manufactured and supplied by Pure Carbonic, Incorporated, an associated Company of U.S.I.

Tells Chemists How To Make Permanent Glass Marking Ink

How plant chemists can make an effective and permanent glass marking ink by mixing equal parts of chromic oxide with powdered lead borate, and stirring into a mixture of equal parts of water, alcohol and glycerine, was disclosed in a recent article. The amount of the liquid depends on the consistency desired.

After applying the ink with a pen and allowing it to dry, the glass is warmed in the yellow flame of a Bunsen burner, then heated to red heat in a blue flame. The glass is finally allowed to cool, using the yellow flame to lower the temperature gradually.

The ink is green, and cannot be used on heavy cast glass equipment such as dessicators, battery jars, reagent bottles or the like, the article points out.

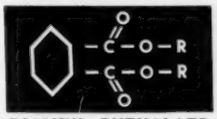
Pacific Coast Division Of U.S.I. Changes Address

The Pacific Coast Division Office of U. S. Industrial Chemicals, Inc., moved from Los Angeles to San Francisco on June 15th. The new address and telephone number are as follows: U. S. Industrial Chemicals, Inc., 15th and Vermont Streets, San Francisco, Calif. Telephone: Market 4212.

Unusual New Applications Prove Versatility of Dialkyl Phthalates

Improved Quality of U.S.I. Phthalate Plasticizers Lead to Use In New Surface Coatings, Adhesives, Lubricants, etc.

Names like nitrostarch, methyl methacrylate and polyvinyl acetate are cropping up in today's discussions of new uses for the dialkyl phthalates. Lacquer chemists hear of diamyl phthalate being used to plasticize complex ester gum-wax-crepe rubber compositions. A recent patent reveals dibutyl phthalate in vinyl chloride-vinyl acetate - chlorinated rubber adhesives.



DIALKYL PHTHALATE

These and a wealth of other examples emphasize the swiftly growing importance of the dialkyl phthalates. Actually, they are among the most widely used agents for softening and imparting flexibility to lacquer films.

The reasons are not hard to find. Low vapor pressure and good retentivity in lacquer films, compatibility with an unusually wide range of lacquer constituents, stability to light, water-white color, lack of odor, and non-toxic character are properties which each of these solvent plasticizers has in a large degree.

Virtually Chemically Pure

U. S. Industrial Chemicals, Inc., was responsible for the introduction of diamyl phthalate and has long been one of the foremost producers of dibutyl, diethyl and dimethyl phthalates. U.S.I. has consistently improved the quality of the dialkyl phthalates and current production provides materials which are virtually chemically pure.

A number of relatively new applications for dibutyl phthalate center about ethyl cellulose. Films of ethyl cellulose retain their toughness and flexibility under conditions of severe aging when plasticized with even as little as 2 to 5% of dibutyl phthalate. This is particularly true in ethyl cellulose-phenolic resin lacquers. For ethyl cellulose adhesives, diamyl, diethyl and dimethyl phthalates have been found equally applicable. In chlorinated rubber, as well as in methyl methacrylate and in nitrostarch, dibutyl phthalate is one of the useful plasticizers.

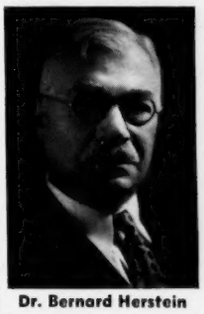
Diamyl phthalate, which because of its low vapor pressure and narrow viscosity range has

(*Continued on next page*)

Dr. Herstein Dies; U.S.I. Chemist Twenty-one Years

Dr. Bernard Herstein, consulting chemist for U. S. Industrial Chemicals, Inc., died June 8 at Shannon Lodge, Bernardsville, N. J., at the age of 73 after a long illness.

He joined U.S.I. in 1918 and was one of the best loved men in the organization. Dr. Herstein also won the respect of chemists throughout the country for his knowledge of chemical economics and for his pioneering development work on dyestuff intermediates and other organic chemicals.


Dr. Bernard Herstein

Born in Bochnia, Galicia, in 1866, he received his doctor's degree from the University of Berlin and came to this country at the age of 28. Here Dr. Herstein had a broad and varied career that included service as technical adviser to many government agencies.

In 1913 he became insular collector of customs and chief of the Bureau of Immigration for the Philippine Islands. Later he was Public Utilities Commissioner for the Islands. In 1918 he prepared a report for the American delegation to the Paris Peace Conference on the chemical industries of the world.

Dr. Herstein was known to be an expert chess player, having for many years held the New Jersey state championship. He was a member of The Chemists Club, the American Chemical Society and the Society of Chemical Industry of Great Britain.

Water-Soluble Inks May Be Used With New Machine For Welding Thermoadhesive Films to Paper, Fabric

JERSEY CITY, N. J.—A welding machine for the rapid lamination of thermoadhesive film to paper, fabrics and other materials, using only heat and pressure, is described in a patent issued to an inventor here.

The inventor disclosed to SOLVENT NEWS that the machine will be used in connection with the application of protective and decorative surfaces on a great variety of base materials—in which field he already holds a number of patents. Among these are patents covering composite films adapted for laminating purposes (films comprising cellulose acetate and other cellulose derivatives, synthetic resins, dialkyl phthalate plasticizers, etc.), as well as laminated articles, and methods and processes for coating and laminating conventional films.

According to the claims in these patents practically any type of printed matter may be laminated without danger of bleeding or smearing the inks, and even water-soluble inks may be used with complete safety.

The inventor reports an extensive licensing plan to make the processes, films, laminated products and machines available to more than fifty industries.

The name and address of the inventor or the patent number may be secured by writing to U.S.I.

ADVERTISEMENT—*This entire page is a paid advertisement.*

July ★ **SOLVENT NEWS** ★ 1939

Says Purified Para Rubber Will Prevent Blood Coagulation

LONDON, England—How films capable of retarding or preventing the coagulation of blood stored in glass vessels can be made by pre-treating para rubber with petroleum ether and alcohol is revealed in a patent issued here.

That the coagulation of blood is retarded on certain surfaces has been known for some time, the inventor points out, but he states he has found that this effect of para rubber can be enhanced by pre-treating as in the following example:

Treat 50 grams of para rubber with 5 liters of petroleum ether. Separate the insoluble components and mix the clear solution with alcohol. Dry the precipitate in vacuo, dissolve in petroleum ether and mix with alcohol again. Repeat this treatment three times then dissolve the purified para rubber in 1 liter of petroleum ether and add 5 c.c. of liquid paraffin.

Shaking this solution in a vessel and allowing it to dry, deposits a glass-clear film which will withstand temperatures up to 130°C., according to the patent papers.

Obtain Morphine Without Concentration of Watery Extract; Higher Yields

BASEL, Switzerland—Two chemists here have just obtained a U. S. patent for the direct extraction of morphine from extremely dilute aqueous extracts of poppy plants by a method which they claim will boost yields beyond any heretofore obtained.

The trick—and quite a trick it appears to be—consists of bringing the aqueous extract to a pH of 9, then mixing it with water immiscible solvents such as amyl alcohol and butyl alcohol, according to the patent.

No Emulsions Form

Under these conditions, the inventors assert, a quantitative transfer of the morphine from the water to the solvent takes place without simultaneous passage into the solvent of any considerable quantities of impurities. The morphine is later recovered by adding acid.

The inventors point out that in previous processes it has been necessary to use costly evaporation procedures to precipitate impurities from the aqueous extracts, with the result that large quantities of the alkaloids were lost by evaporation, occlusion and adsorption. Other attempts at direct extraction has failed because of the formation of troublesome emulsions and the transfer of impurities.

Amyl Alcohol and Butyl Alcohol are produced by U.S.I.

New Tracing Paper Can Be Erased Or Washed

LONDON, England—Correctable tracing paper patented here recently has a protective layer of cellulose nitrate, resin lacquer, etc., and a filler of talc, MgO, etc., and optionally, a softener such a tritolyl phosphate. The inventor claims that this protective layer absorbs the drawing ink but prevents it from reaching the paper.

The ink for use with this paper contains a solvent for the cellulose nitrate and may comprise shellac in alcohol and water, spirit lacquer, tritolyl phosphate and lamp black. The ink may be erased or washed off and the protective layer restored, the patent states.

New Applications Prove Phthalates' Versatility

(*Continued from previous page*)

been utilized to replace mercury in vacuum pumps, is specified in a recent patent as a plasticizer for paper coatings consisting of resins, crepe rubber and wax. Along with the three other phthalates, it is now accepted as a good plasticizer for cellulose acetobutylrate. It is also formulated in rubber cements.

In Cellulose Acetobutyrate

The combination of diamyl and dibutyl phthalates is finding increasing use as a plasticizer in nitrocellulose lacquers for paper and artificial leather, which demand unusually high flexibility. Both phthalates may be employed to plasticize cellulose acetopropionate.

Dimethyl and diethyl phthalates are today virtually the most widely used plasticizers for cellulose acetate. However, both products have other novel applications, some of which may become more significant. Diethyl phthalate, dissolved in SOLOX,* has a transparentizing effect on paper. Diethyl phthalate is a recognized fixative for perfumes, as well as an authorized denaturant for specially denatured alcohol formulas 39B and 39C.

U.S.I. welcomes the opportunity to give responsible manufacturers more detailed information regarding particular applications for dialkyl phthalates.

*Trademark registered.

TECHNICAL DEVELOPMENTS

Further information on these items may be obtained by writing to U.S.I.

Control over the swelling, shrinking and checking of wood due to absorption or loss of moisture, is claimed for a liquid applied by brush, spray or dip without the use of vacuum or pressure. There is said to be no discoloration of the wood or offensive odor and the lumber may be glued up and finished with stain, varnish, lacquer, enamel or paint after machining and final sanding. **(No. 230)**

U S I

A new detergent and emulsifying agent, said to be readily soluble in cold water and to be equally effective in neutral, acid or alkaline solutions is now available in paste form for use alone or in combination with soap. The product is chemically neutral, does not hydrolize, resists the formation of insoluble lime precipitates in hard water and has marked stability to most metallic salts, according to the manufacturer. **(No. 231)**

U S I

For opening knocked-down cartons of any type, a new machine is said to automatically place in position for packing from 15 to 18 containers per minute. The manufacturer claims that the machine speeds packaging of bottles, cans or unit cartons, in plants previously employing one or more persons to square up folded shipping containers. **(No. 232)**

U S I

Seamless, transparent latex tubing, smooth inside and out and as strong as virgin rubber, was announced recently. The tubing resists aging and repeated sterilization and is sufficiently transparent to see the liquid through it, the announcement states. **(No. 233)**

U S I

For bonding rubber to metal or enameled finishes, or felt to metal, a new adhesive may be made to dry quickly, according to a recent announcement. The new adhesive is easily applied and is unaffected by weather conditions, the maker states. **(No. 234)**

U S I

A two-tone finish on metal surfaces can be produced by a single spray followed by baking, according to the manufacturer of a new paint. A variety of colors are said to be available in from 1-gal. cans to 55-gal. drums. **(No. 235)**

U S I

A vacuum pressure pump designed to handle liquids of all kinds without their coming in contact with metal, has been announced. The tubing used in the pump varies, depending on the liquid to be pumped, and ranges from pure gum rubber to acid-resisting synthetic materials. **(No. 236)**

U S I

A new aniline ink said to be suitable for printing on pliofilm, a cellophane-like material, was announced recently. **(No. 237)**

U S I

For cleaning cement floors prior to painting, a new product is said to remove grime, dirt and mineral oils instantly. It is described as a phenolic type compound. **(No. 238)**

U.S.I. INDUSTRIAL CHEMICALS, INC.

60 EAST 42ND ST., N.Y. (U.S.I.) BRANCHES IN ALL PRINCIPAL CITIES

A SUBSIDIARY OF U. S. INDUSTRIAL ALCOHOL CO.

ALCOHOLS
Amyl Alcohol
Butyl Alcohol
Fusel Oil—Refined
Methanol

Ethyl Alcohol
Anhydrous
Absolute
C. P. 96%
Pure (190 proof)
Specially Denatured
Completely Denatured
U. S. I. (Denatured Alcohol Anti-freeze)
*Super Pyro Anti-freeze
*Solox Proprietary Solvent

***ANSOLS**
Ansol M
Ansol PR

ESTERS, ACETATES
Acetic Ether
Amyl Acetate
Butyl Acetate
Ethyl Acetate

ESTERS, ETHYL
*Diatol
Diethyl Carbonate
Diethyl Oxalate
Ethyl Chlorocarbonate
Ethyl Formate
Ethyl Lactate

*Registered Trade Mark

ESTERS, PHTHALATES
Diamyl Phthalate
Dibutyl Phthalate
Diethyl Phthalate
Dimethyl Phthalate

OTHER ESTERS
Amyl Propionate
Butyl Propionate
Dibutyl Oxalate

INTERMEDIATES
Acetoacetanilid
Acetoacet-o-chloranilid
Acetoacet-o-toluidid
Ethyl Acetoacetate
Sodium Ethyl Oxalacetate

ETHERS
Ethyl Ether
Ethyl Ether Absolute—A.C.S.

OTHER PRODUCTS
Acetone, C.P.
Butyl-mesityl-oxide-oxalate
Cellulose Acetate
Collodions
*Curbay Binders
*Curbay X (Dried Curbay)
*Derex
Ethylene
Methyl Acetone
Nitrocellulose Solutions
Potash, Agricultural
*Vacatone

Solvents

Coatings Makers Reduce Production Schedules

Slack Season In Automotive Centers Expected To End Early In August—C. D. Alcohol, Carlots, Drums, Reduced 2c—Demand For Petroleum Solvents Spotty—Acetone Firmer—

THE usual and not unexpected let-down in the volume of shipments of the principal solvents took place last month. Production of automobiles declined from the May figure and further curtailment will take place in the Detroit area over the next few weeks. Manufacturers of industrial coatings have reduced operating schedules accordingly, but definite improvement is expected very early in August. The introduction of new models will come much earlier this year than last and car manufacturers are planning to switch over about the middle of August.

The rubber companies reduced their demands quite noticeably in the past 30 days. However, the movement of solvents into this consuming channel over the first 5 months of the current year shows considerable gain when comparison is made with the corresponding period a year ago.

C. D. in Drums Off 2c

Further weakness developed in the C.D. alcohol market. A reduction of 2c per gal. was reported for carlots, drums, bringing the price to a basis of 27½c, but quotations were unchanged on tanks and drums in l.c.l. quantities. There were no changes reported for specially denatured or pure ethyl. Consumption of alcohol for industrial purposes has held up well.

A firmer tone was again in evidence for methyl acetone and suppliers during the past month announced another advance, this one of 3c making the tank quotation 28c. Steadier prices for acetone were reported and in some quarters the opinion was expressed that higher prices might come through, but so far no definite indication of this possibility has been given by the principal factors. Despite the seasonal decline in consumption of solvents and plasticizers the market for butyl alcohol, butyl acetate, tricresyl phosphate, etc., exhibited stronger price tendencies.

Firmness characterized the markets for most of the petroleum solvents, although reports from the Chicago area indicated that price shading was in evidence on tankwagon quotations. A reduction of 1c per gal. for No. 1 high-solvency naphtha was announced during the middle of the month and the new quotation is 13c f.o.b. refinery. No. 30 naphtha declined ½c to a basis of 14½c. A slackening in the demand for petroleum thinners and V. M. & P. naphthas was in evidence caused by the seasonal let-down in paint production, but, on the other hand, an excellent volume of business was placed for Stoddard solvent and cleaners' naphtha. There were some indications of slightly lower prices for butane and propane.

Important Price Changes

	June 30	May 31
ADVANCED		
Methyl acetone, tks.	$0.28	$0.25
DECLINED		
Alcohol, C. D. c. l., drs.	$0.27½	$0.29½
Perchlorethylene, less than 5 drs.	.08½	.08¾
Trichlorethylene, less than 5 drs.	.08½	.08¾

Ethyl Alcohol Output Up

Production of ethyl alcohol rose to 18,655,264 proof gals. in May, about 25% over last year's corresponding figure of 14,252,840 gals. Although output has increased steadily during '39, the totals for the 11-month period beginning July, '38 and for the like period of 12 months earlier are substantially the same. May output was about 800,000 gals. above April's.

C. D. leaped nearly 190% in the April-May period this year. April output was 240,918 wine gals., whereas May's was 695,326 gals.—showing poorly, however, against 903,603 gals. in May, '38. Deliveries of C. D. moved correspondingly, but end-of-month stocks increased relatively little from the April figure, 518,723 gals., to 608,807 gals. in May.

S. D. formulas were produced in but little greater volume during May, as compared with April. May's output was 7,795,113 gals., and April's amounted to 7,477,590 gals. Increase in 1939 S. D. production has continued, May and April figures being from about 28 to 50% greater than those recorded for the like months of '38. Deliveries have also increased, in approximately the same amount. S. D. stocks in May were substantially larger than in any month of this year, having risen to over 1,150,000 gals.

Construction

CARBIDE & Carbon Chemicals will spend $1,500,000 for additions to the South Charleston (W. Va.) works.

American Cyanamid has broken ground for its new plant at Kalamazoo, Mich., expected to be in operation by Fall. New quarters will house equipment now in service at company's Race st. (Kalamazoo) plant; latter building will be maintained as a warehouse.

McDonald and Kahn Co., Ltd., of San Francisco, Calif., has been awarded the contract to construct the Western Regional Research Laboratory to be located at Albany, Calif. Contract calls for the completing in 365 calendar days of the entire administration unit, the chemical laboratory wing, and the entire service building and power plant, for the amount of $817,000.

Columbian Carbon Co., Charleston, W. Va., has completed arrangements with the Girdler Corp., Louisville, Ky., for the erection of a gas purification plant in Kanawha County, W. Va. Plant, which will have a daily capacity of 30,000,000 ft. of gas, will remove hydrogen sulfide from sour natural gas. Construction will be carried out by J. F. Pritchard & Co., Kansas City, Mo.

Richard L. Cawood, president, Patterson Foundry & Machine, East Liverpool, O., has announced a program of plant improvements to be carried out at the East Liverpool plant during the summer months. At the Machine Division approximately $50,000 is being spent on new machine tools to be used mostly in the manufacture of the company's line of mixers, while at the Porox Division approximately $30,000 is being spent on additional machinery for the manufacture of porox grinding balls and for modernization of the drying system at this plant.

Equipment Company News

Buffalo Foundry & Machine has opened a new branch office in Cleveland, O., 726 Keith Building, in charge of Malcolm S. Adler.

Production activities have again been put in full swing by Allis-Chalmers, Milwaukee, following a short work holiday and strike early in June at West Allis.

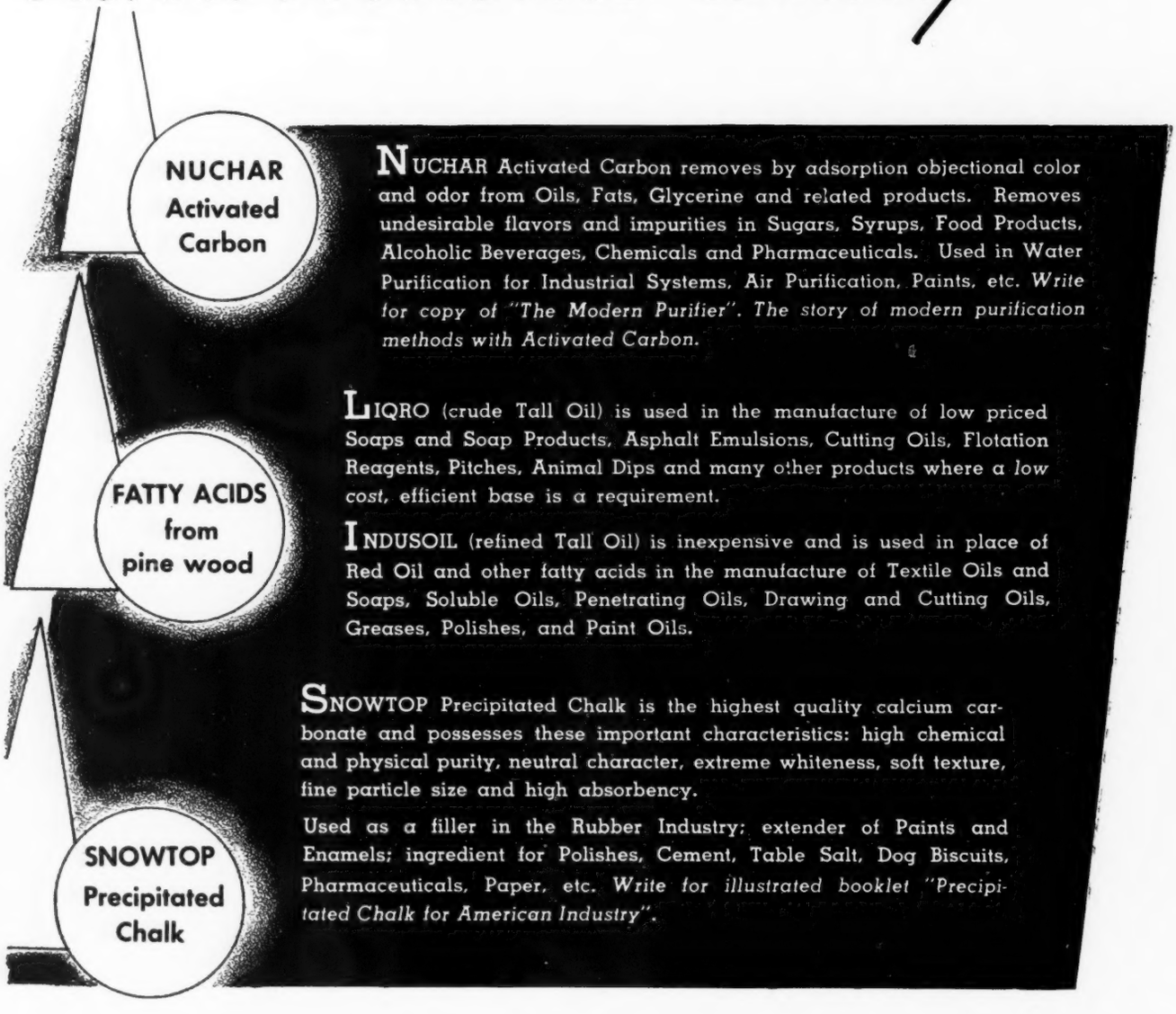
Gillette Honored

Leslie S. Gillette, U. S. Industrial Chemicals, N. Y. City, was elected vice-president, N. Y. Sales Managers' Club, at its annual meeting June 9 in the Advertising Club, N. Y. City.

Tertiary Butanol Suit

The patent suit involving the use of tertiary butanol in specially denatured alcohol formulas was terminated June 26 with parties' consent in U. S. District Court in Chicago. Suit, brought by Robert H. Van Schaack, Jr., against U. S. Industrial Alcohol, N. Y. City, charged infringement of the so-called Calvert patent (No. 1,919,145) in using 0.125% tert. butanol as a denaturant as required by Internal Revenue formulas SDA 39A, 39B, and 40. Parties agreed, according to the court's decision, that this use is not an infringement of the patent.

Progress of tomorrow comes from Chemical Achievements today



NUCHAR Activated Carbon removes by adsorption objectional color and odor from Oils, Fats, Glycerine and related products. Removes undesirable flavors and impurities in Sugars, Syrups, Food Products, Alcoholic Beverages, Chemicals and Pharmaceuticals. Used in Water Purification for Industrial Systems, Air Purification, Paints, etc. *Write for copy of "The Modern Purifier". The story of modern purification methods with Activated Carbon.*

LIQRO (crude Tall Oil) is used in the manufacture of low priced Soaps and Soap Products, Asphalt Emulsions, Cutting Oils, Flotation Reagents, Pitches, Animal Dips and many other products where a *low cost*, efficient base is a requirement.

INDUSOIL (refined Tall Oil) is inexpensive and is used in place of Red Oil and other fatty acids in the manufacture of Textile Oils and Soaps, Soluble Oils, Penetrating Oils, Drawing and Cutting Oils, Greases, Polishes, and Paint Oils.

SNOWTOP Precipitated Chalk is the highest quality calcium carbonate and possesses these important characteristics: high chemical and physical purity, neutral character, extreme whiteness, soft texture, fine particle size and high absorbency.

Used as a filler in the Rubber Industry; extender of Paints and Enamels; ingredient for Polishes, Cement, Table Salt, Dog Biscuits, Pharmaceuticals, Paper, etc. *Write for illustrated booklet "Precipitated Chalk for American Industry".*

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Oils and Fats

Drying Oils Score Price Advances

Several Importers Withdraw From Chinawood Market—Soybean Quoted Lower—Crude and Refined Fish Oils Weak—Tallow, Grease and Animal Oils Decline in Light Trading—

THE price movement in the leading fats and oils in the past 30 days was decidedly a mixed one with, however, declines outnumbering the advances. Generally speaking, the drying oils moved into higher price ground taking the advance in Chinawood as an excuse, while the vegetable and fish oils lost ground.

Little Chinawod Offered

The market for Chinawood in the last month was again largely a nominal one. Very little oil is actually being offered by importers for but very few are in a position to take a definite position on deliveries. Little new oil is said to be reaching the shipping ports of Hong Kong or Shanghai. There were several inquiries going the rounds, but very little actual business was placed. Sympathetic rises were noted in other paint oils, including perilla, oiticica and to a less extent linseed.

"Soapers" Show Little Interest

Crude corn oil was quoted slightly higher but the refined grade lost ground in light trading. Soapers appeared to be only mildly interested in crude coconut. Supplies of copra are heavy and some factors in the market are decidedly bearish on coconut oil prices over the next 60 to 90 days. After several months of price stability soybean quotations declined rather sharply based on the sizable increase in the current crop and recent developments in the competing product. Both crude menhaden and crude sardine lost ground and as a result the refined grades were quoted at lower levels. Generally speaking, most of the animal fats and oils were weak with a number of important price declines registered. Tallow and grease worked into lower price levels.

Important Price Changes

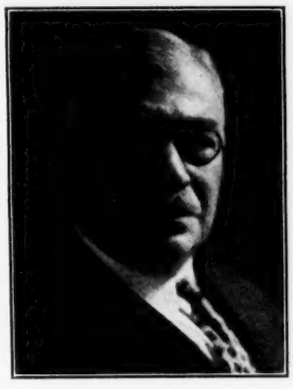
	June 30	May 31
ADVANCED		
Oil Chinawood, drs.	$0.21½	$0.17¾
tks.	.20	.17
Coconut, edible	.08¾	.08⅛
Corn, crude, tks.	.06½	.05⅞
Linseed, boiled, tks.	.089	.088
Oiticica	.13	.11½
Perilla, drs.	.10¾	.09⅝
tks.	.102	.101
DECLINED		
Oil babassu, tks.	$0.06⅛	$0.06¾
Coconut, Manila, crude	.03⅛	.03⅜
Pacific Coast, tks.	.02⅞	.03
Corn, ref'd, bbls.	.08½	.08¾
Lard, common	.08½	.08¾
Menhaden, crude, tks.	.26	.32
ref'd alkali, tks.	.064	.066
light-pressed, tks.	.058	.06
Neatsfoot 20° cold test.	.14¾	.15¼
Olive oil foots	.06⅞	.07
Peanut, crude, tks.	.05⅝	.05¾
ref'd, edible	.08¾	.08⅞
Sardine, crude, tks.	.30	.33
ref'd alkali, tks.	.064	.066
light-pressed, tks.	.058	.06
Soybean, crude, tks.	.05⅛	.055
ref'd, tks.	.06⅜	.067

British Cod Oil Standard

Specifications giving properties required for a good cod liver oil have been issued by the British Standards Institution. Included in the bulletin are methods for assaying vitamins A and D, approved by the General Medical Council, British Medical Association, and also excerpts from the report of the 2nd Conference on Vitamin Standardization, League of Nations Health Organization. Copies of this, the 3rd standard in a series being prepared for marine animal and fish oils, may be obtained from the Institution at 28 Victoria st., London, S. W. 1 (2s. 2d., post free). (*Chemical Age*, May 27, '39, p. 394.)

Obituaries

Dr. Bernard Herstein, 73, died June 8 at Bernardsville, N. J. Until his retirement last February, he was consultant for U. S. Industrial Alcohol, with whom he had been associated for 20 years.



A native of Poland, Dr. Herstein received his Ph.D. from the University of Berlin in 1889. After serving with several chemical companies in the U. S., he became a member of the staff of the Bureau of Chemistry at Washington, D. C., and, from 1912-1913, was examiner of chemicals for U. S. Customs, Port of N. Y. During that time he was also tariff adviser of the Congressional Committee on Ways and Means. In 1913-1917, he was Collector of Customs of the Philippines.

Dr. Herstein was a member of the Chemists' Club in (N. Y.), Society of Chemical Industry, and the A. C. S. He is survived by 2 sons, Karl M. Herstein, Brooklyn, N. Y., and Frederick E. Herstein, Baltimore, and by 2 daughters, Mrs. Lillie Greenberg, Hackensack, N. J., and Mrs. Jane H. White, N. Y. City. Mrs. Herstein died in 1932.

Other Deaths of the Month

Guy Pinner, 51, chief engineer, American Cyanamid Co., N. Y. City, died on June 25 in Larchmont, N. Y. He had been with the company for the past 10 years.

J. B. Adams, 72, president, Longview-Saginaw Lime Works, Birmingham, Ala., died June 14 after a long illness. Mr. Adams had been engaged in the manufacture of lime products in Alabama for over a half century.

Eric Davis Redding, 28, secretary and member of the directorate of J. H. Redding, Inc., importer of vegetable oils, N. Y. City, suddenly, on June 11.

William B. Hardcastle, works manager of the Spencer Kellogg plant in Edgewater, N. J., and president of the Edgewater Manufacturers Association, died May 31 at his Teaneck, N. J. home, after a long illness.

Eugene J. Droesch, 53, assistant in the chemical department, American Cyanamid, N. Y. City, died June 20 at his home in Floral Park, L. I. He had been ill for about 6 months.

Widely known in chemical industry, Mr. Droesch started as a boy of 13 with A. Klipstein & Co., N. Y. City, chemical importers. American Cyanamid absorbed the Klipstein firm in January of 1931. Mr. Droesch is survived by his widow and 2 nieces.

Founder Am. Oil & Supply

William F. Hoffman, 72, prominent New Jersey industrialist and banker who was widely known in the chemical field, died July 4 at his summer home in Deal, N. J., after a year's illness.

A resident of East Orange, N. J., he was chairman of the board, Irvington Varnish and Insulator Co., a director of the Congoleum-Nairn Co., chairman of the board of the United States Saving Bank of Newark and formerly active in numerous other business and industrial enterprises.

Born in Newark, the son of Mr. and Mrs. Eugene E. Hoffman, he was graduated from Newark High School at the age of 16. Through his father, who had been an employee of Standard Oil of New Jersey, he obtained work with that corporation and for years was one of its star salesmen. When 30 years old he organized the American Oil & Supply Co. and was its vice-president until 1929.

News of the Specialties

¶ 7th Circuit Court Reverses Decision of District Court on the Important Agicide Case—New Mellon Fellowship Announced—Packaging Exposition Dates Announced—

U. S. Circuit Court for the Seventh Circuit reversed the decision June 30 of the Eastern Wisconsin district court in the Agicide case. Suit involved the validity of the Dennis patent on the use of cube root as an insecticide. Appellate court dismissed the action against the Agicide Laboratories ruling that the latter had not infringed any basic claim of the patent.

To Study Precast Units

Cemenstone Corp., Pittsburgh, has established an industrial fellowship at Mellon for conducting chemical and physical research on precast concrete units such as are being produced by new principles of manufacture by the donor company. Main objective of the project is to develop novel practical technics that will be of wide applicability in precast concrete production. Donald R. MacPherson, formerly a member of the research staff of the Portland Cement Association, Chicago, is the incumbent of the new fellowship.

"B. O." Recognized

Lever Bros. Co., Cambridge, Mass., has a right to the use of the letters "B. O." sufficient to permit it to oppose registration of a similar trade mark, according to a ruling of the Court of Customs and Patent Appeals. Company opposed application of Nobio Products, Inc., for registration of the word "Nobio" for a liquid personal deodorant.

Nopco Plans New Unit

National Oil Products Co., Harrison, N. J., is to erect a 5-story brick or concrete building to house equipment providing additional facilities for the production of industrial chemicals and processing oils. Nopco.'s new unit will be located on the Passaic River site of its Harrison plant, and is to be completed this year.

Beacon Co. Appoints

Beacon Co., manufacturing chemist, Boston, Mass., has appointed as its representatives the following concerns: F. L. Bourgeoise S. A., Rue Aux Lits 13, Tower Building, Antwerp, Belgium; L. C. Morris Co., 223 Spring st., S. W., Atlanta, Ga.

New Can Co. Formed

Robert S. Solinsky, Chicago Com. Executive who resigned recently as assistant vice-president of National Can Co., is president of a new can mfg. company. This new company has acquired the plant and assets of the Independent Can Co., of Plano, Ill., and have installed much of the equipment in the new Can, Inc. plant at 3217 W. 47th Place, Chicago, Ill., where they will manufacture a complete line.

Mr. Solinsky is a native Chicagoan, educated in the Maywood schools. He went to work in 1907 as office boy at the American Can Co.'s Maywood plant. Thence to the Continental Can Co., sales and in 1923 was made manager of sales for the Central District. This position he held until 1935 when he joined National Can as assistant vice-president. He is a former president of the Chicago Paint, Varnish & Lacquer Association.

Trade-Mark Law Revision

General revision of the trade-mark law, increasing of patent examining personnel, and administrative changes to speed up the present patent office routines are among points to be considered by the House, when it is presented with recommendations for early action on 6 bills by the House Patents Committee.

Beetle Resin Sales

Calco Chemical Co., through its home office at Bound Brook, N. J., will handle all correspondence relating to the sale of American Cyanamid's Beetle resins for textile finishing. Shipments, as hitherto, will be made from the Beetle Products Division factory at Bound Brook.

Measuring Glued Joints

Milligan & Higgins, glue and gelatin manufacturer, N. Y. City, has devised an apparatus for accurately measuring the strength of glued joints. The "joint-breaker," invented by William Kneen, Jr., of the company's Joint Testing Laboratory, operates on a shear principle.

NEW PRESENTATION

Robert Gair Company designed this attractive counter display case for the Russia Cement Co.

Packaging Institute, Oct. 12

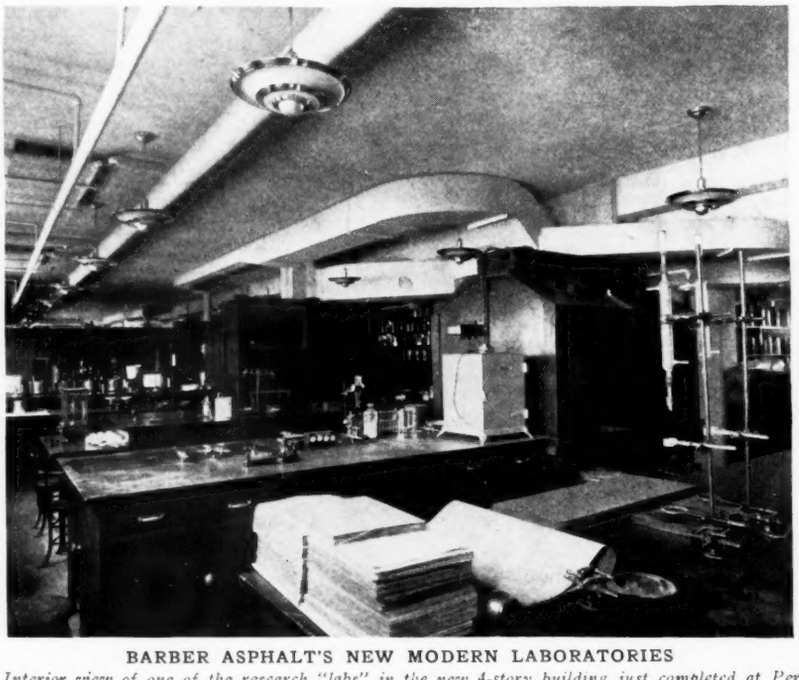
Packaging Institute, Inc., will have its first annual meeting Oct. 12-13, at Edgewater Beach Hotel, Chicago.

Announces Exposition Dates

The 10th Annual Packaging Exposition and Conference will be held Mar. 26-29, 1940, at the Hotel Astor, it is announced by the American Management Association, sponsor of the event.

Now Legrand Chemical

Legrand Bleach Corp., Brooklyn, N. Y., has been authorized to change its corporate name to Legrand Chemical Corp., as of June 1. Company manufactures line of chemical specialties.



BARBER ASPHALT'S NEW MODERN LABORATORIES

Interior view of one of the research "labs" in the new 4-story building just completed at Perth Amboy, N. J. Building is air-conditioned throughout and the last word in fire-proof construction.

Coal-Tar Chemicals

Domestic Cresylic Acid Reduced Sharply

Competition With Imported Forces Lower Prices—Cresol, U.S.P. Quoted ½c Lower—Prices of Important Intermediates Revised—Phenol Weak—Naphthalene Sales Rise—

A NUMBER of important price changes in several coal-tar chemicals were reported at the mid-year. Due to highly competitive conditions, domestic manufacturers of cresylic acid instituted sharp reductions in their quotations for business over the last 6 months of the year. High-boiling in carlots is listed at 49c, freight equalized with producing points, low-boiling at 55c in carlots, also freight equalized. The markets for these products have been marked by heavy competition between imported and domestic material for a long period.

Other reductions included a ¾c decline in the synthetic resin grade of cresol and a ½c drop in U.S.P. cresol. The latter is now at 9½c in drums in carlots. The spread between the carlot and l.c.l. price for tar acid oils was narrowed when producers reduced the l.c.l. quotations 1c. The 15% material is now 23c for l.c.l. lots and 27c for the 25% grade.

Quotations for the last half of the year on ortho, meta and para cresols remain unchanged from former price levels. The schedule is as follows: Ortho cresol, 30.4° carlots, 14½c per lb. and less carlots, 15c; 30-30.4°, carlots, 14c, and less carlots 14½c; 29-30°, carlots, 13½c and less carlots, 14c, f.o.b. works, freight equalized, drums returnable at seller's expense. Para cresol, 98-100%, carlots, 42c, less carlots, 43c; 92-94%, carlots, 34c, and less carlots, 35c. Meta cresol, 80-82%, carlots, 15c, less carlots, 16c; 70-75% carlots, 12c and less carlots, 13c, f.o.b. works, drums returnable at buyer's expense.

Price Changes In Intermediates

Several important price revisions were made in the intermediates. Metanitroparatoluidine, paranitrotoluene and paratoluidine were reduced while advances were announced for orthonitrotoluene and orthotoluidine. Practically all prices on the coal-tar colors were renewed unchanged with the exception of azorubin red and crocein scarlet. No changes were made in quotations on creosote oil, crude and refined coaltar and coal-tar pitch.

Demand for the principal coal-tar solvents slowed down somewhat in June largely due to the curtailment of operating schedules on the part of the industrial coatings manufacturers. The fear that shortages would develop as a result of the coal strike no longer exists. There still remains, however, some shortage of benzol. Suppliers have been able to take care of all the domestic business, but some export inquiries have been turned down.

Important Price Changes

	June 30	May 31
ADVANCED		
Orthonitrotoluene	$0.09	$0.08
Orthotoluidine	.19	.16
DECLINED		
Acid cresylic, dom., H. B.	$0.49	$0.55
L. B., dom.,	.55	.63
Cresol, syn. resin grade	.08¼	.09
U. S. P.	.09½	.10
Metanitroparatoluidine	1.30	1.40
Naphthalene, crude, imp.	1.50	1.55
Paranitrotoluene	.30	.35
Paratoluidine	.48	.56
Tar acid oil, l. c. l.	.23	.24
25%, l. c. l.	.27	.28

The hot weather in the past two or three weeks has stimulated the sale of naphthalene. Importers of crude announced a slight reduction of 5c per 100 lbs. to a basis of $1.50, but very little actual business was transacted at this price.

Some weakness was said to be developing in phenol. Productive capacity on this item is expanding rapidly. Shipments in the past month declined slightly from the May level.

Output of Crudes Lower

May production of light oil totaled 9,675,128 gals., as compared with 11,763,775 gals. in April and 9,254,396 gals. in May of '38. Output for the first 5 months reached 61,339,841 gals., as compared with only 51,335,657 gals. in the like period a year ago. May tar recovery reached 29,329,847 gals., against 35,593,547 gals. in April and 28,054,402 gals. in May of '38. Production in the first 5 months totaled 185,949,088 gals., compared with but 155,611,792 gals. in the first 5 months of last year.

U. S. Dye Statistics

China, prior to the outbreak of hostilities in the Orient, was a leading foreign market for American dyes, but since the beginning of '38 shipments to that area have declined sharply, according to the Chemical Division, Dept. of Commerce. Dyes aggregating 6,000,000 lbs. were exported from the U. S. to China in '37. The total decreased to less than 2,000,000 lbs. in '38 and in the first quarter of the current year to only 210,000 lbs.

Dye production in the U. S. decreased 33½% to a total of 81,000,000 lbs. in '38 compared with the preceding year and sales during these periods were recorded at from 118,000,000 and 87,000,000 lbs. respectively, Tariff Commission reports indicate. British dyestuffs production declined 28% to 45,500,000 lbs. last year from 63,000,000 lbs. reported in '37 according to Board of Trade Statistics.

RICHARD P. BROWN

Former president and now board chairman, Brown Instrument, is the first secretary of the new Dept. of Commerce of Pennsylvania.

Calco Safety Awards

Eighty-three Calco employes recently were awarded Class A certificates by the company's safety organization in recognition of three years of accident-free work. The new awards brought to 1,097 the total number of Calco workers now registered as Class A members of the safety group.

To Add To Phthalic Unit

Reichhold Chemicals, Detroit, plans to erect an additional plant unit to provide a minimum annual capacity of 7,000,000 lbs. phthalic anhydride. Company's present phthalic plant at Detroit has been operating for about a year.

Food, Drug Act Effective

Federal Food, Drug, and Cosmetic Act became effective on June 25. Lea Bill was signed June 23 by the President, providing for the postponement to Jan. 1, 1940, of the sections relating to new coal tar colors and new affirmative labeling requirements. Lea Bill also authorizes a conditional postponement for such labeling requirements on a "cause shown" basis.

Forker Elected a Trustee

J. N. Forker, a vice-president and director of Koppers, in charge of the Tar and Chemical Division, has been appointed to the board of trustees, Eastern Gas and Fuel Associates, Boston.

Data on Coal Analyses

National Coal Publications, 304 Law Bulletin Bldg., Pittsburgh, have published "Proximate Coal Analyses," a new series of completely cross-indexed volumes containing complete analyses data, filed with the National Bituminous Coal Commission by the District Producers Boards.

Skinner Promoted

Dr. W. W. Skinner is now associate chief, Bureau of Agricultural Chemistry and Engineering, U. S. Dept. of Agriculture. He has been with the Department for nearly 35 years, and was formerly assistant chief, Bureau of Chemistry and Soils.

Raw Materials

War Scare Hits Raw Material Buying

Easier Tone Noted In Corn Derivatives—Tapioca Flour Advanced—Japan Wax Strong—Albumen Prices Weaken—Less Demand For Natural Varnish Gums—"Turps" Quiet—

MOVEMENT of most of the natural raw materials was rather listless in the past month. Buyers are still mindful of the unsettled foreign situation and as a result are unwilling to contract ahead in large quantities not knowing what actually would happen to prices should a major conflict break out. In addition, while business activity generally has shown a decided betterment in the past few weeks, such improvement has not reached the stage as yet where large inventories and heavy future commitments appear to hold definite advantages.

A turn for the better now seems likely in at least certain branches of the textile field and a fair volume of activity likewise seems probable in the tanning industry, but as yet this optimism has not been translated into any noticeable increase in the tonnages placed for natural dyestuffs and tanstuffs.

A slightly easier tone was reported in the starches and dextrin, caused by weakness in the grain, but at the month-end no definite price alterations were announced by leading suppliers. Slightly lower prices were also announced for both domestic and imported blood albumen.

Shellac Weakens

The shellac markets were featured by ½c declines in both T. N. and Superfine. Buyers continue to purchase on a "hand-to-mouth" basis. June volume was below that experienced by suppliers in May and the outlook over the next two months is for a continuance of the quiet conditions that have prevailed now for several months. Stocks in London are gradually being reduced, but they are still a definite deterrent to any sweeping rise in prices in this country.

The call for natural varnish gums diminished last month. Pricewise the only revisions of importance in the group were the following: Batavia A/D down ½c to 13⅛c; A/E off ½c to 11⅜c; a reduction of ⅜c for Singapore No. 1 to 13¼c, and a similar drop in No. 2 to 10½c.

In the waxes the outstanding news was continued strength in Japan and Candelilla. There appears to be some scarcity of the yellow grades of Carnauba and firmer prices were the inevitable result. Buyers, however, are said to be well stocked and this seemed to be borne out by the fact that spot inquiries were few and far between at the month-end.

The price movement in naval stores was between very narrow limits in the past 30 days. The volume of business continues to be disappointing and this plus the large holdings of government controlled rosin and turpentine have been the principal factors in holding prices down. Receipts at the primary markets have been light and below earlier expectations, lending some degree of bullishness to an otherwise bearish feeling on naval stores prices.

Important Price Changes

	June 30	May 31
ADVANCED		
Mangrove bark, non-fibrous	$25.25	$24.00
Myrobalans, J 1	26.00	25.00
J 2	20.00	19.00
Tapioca flour	.02½	.02¼
DECLINED		
Albumen, blood, imp.	$0.60	$0.65
egg dom.	.60	.62
imported	.60	.62
Cutch, Philippine	.04	.04¼
Egg yolk	.56	.60
Gum, dammar, Batavia A/D	.13⅛	.13⅜
A/E	.11⅜	.11⅞
Singapore No. 1	.13¼	.13⅜
No. 2	.10½	.10⅞
Shellac, T. N.	.09½	.10
superfine	.09½	.10
Sumac, grd.	66.00	66.50

Mazein In Production

Corn Products Refining Co., N. Y. City, now manufactures zein at its Pekin, Ill., plant. Product, called "Mazein," is sold in 50-lb. bags. Prolamine Products Co., Inc., N. Y. City, also markets zein, under the name "Mazite."

Offers New Technical Service

American Maize-Products Co., N. Y. City, offers to confectioners a new technical service devised to permit the maintenance of high quality in confections regardless of the widely different atmospheric conditions prevailing in different parts of the country.

Personals

Dr. William J. Hale, Dow Chemical's director of research, has resigned as secretary of the National Farm Chemurgic Council. Robert D. McMillen, Council's director of information, is now acting as secretary in Dr. Hale's stead.

George Oenslager, B. F. Goodrich Co., received the honorary Sc. D. from Akron University at its commencement exercises last month.

Charles H. Stone, Charlotte (N. C.), was elected president of Charlotte Rotary Club last month. He is American Cyanamid's production manager for the Southern branch.

Dr. G. N. Hoffer, midwest manager, American Potash Institute, received the honorary degree of Doctor of Science from Purdue University, on June 11.

Paul A. Dunkel, head of Paul A. Dunkel & Co., N. Y. City, was low scorer, with a 78, in the golf tournament held June 16 at the outing of the N. Y. section, American Association of Textile Chemists and Colourists, at North Jersey Country Club, Paterson, N. J.

William J. Harshaw, president, Harshaw Chemical Co., Cleveland, O., won the $1,000 grand prize of the New York Hotels' Association drawing. Mr. Harshaw was in N. Y. City on Decoration Day and bought a 50c chance in the drawing from a hotel employee.

William A. Hart, Du Pont's advertising director, is now a director of the Advertising Federation of America, Inc.

Robert J. Barbour, Bakelite Corp., is president of the Technical Publicity Association, N. Y. chapter of the National Industrial Advertisers' Association.

Francis J. Curtis, director of Monsanto Chemical's development department, was the speaker at the June meeting of the Yellow Springs, Ohio, A. C. S. section.

L. W. Myers, research director, Emery Industries, Cincinnati, has been elected a member of the Industrial Research Institute, N. Y. City, affiliated with the National Research Council.

Willard Dow, president, Dow Chemical Co., Midland, Mich., received the honorary Sc. D. from Michigan School of Mines at the latter's commencement exercises.

WILLARD H. DOW
Honored by Michigan School of Mines

Dr. W. A. Wesley, of International Nickel's research laboratory at Bayonne, N. J., received the gold medal of the American Electro-Platers' Society at its 27th annual convention in Asbury Park, N. J. The award, presented annually, was made in recognition of Dr. Wesley's paper on "Physical Properties and Uses of Heavy Nickel Deposits."

Agricultural Chemicals

Chilean Nitrate Quotations Renewed for '39-'40

Cyanamid Price Reduced and Method of Quoting Changed—Some Grades of Imported Potash Lower For Next Season—Organic Ammoniates Weak—Fertilizer Tag Sales Up—

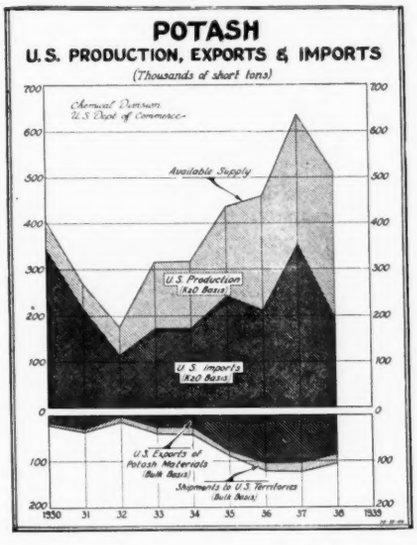
THE interest of the fertilizer industry last month centered almost entirely on the various announcements concerning raw fertilizer material prices for the next mixing season. The existing prices for Chilean nitrate are to be carried over for 1939-'40 without change. The same condition is likewise true for anhydrous ammonia, urea-ammonia liquor and calcium nitrate. Sulfate prices were reported in the June issue.

No announcement was forthcoming (July 5) from the domestic producer of synthetic sodium nitrate.

The method of pricing cyanamid has been changed. The new price is $1.27½ per unit of nitrogen as compared with $1.15 per unit of ammonia and actually represents a slight decline in price.

Over a space of two weeks announcements were received by the trade from 3 of the domestic producers of potash. For minimum 50% K_2O muriate the price continues at 53½c per unit for shipment in bulk, one ton or more. There are variations in the seasonal discounts, depending upon the supplier.

One of the leading importers of potash has announced several important price reductions. Kainit, in bulk, was reduced


POTASH
U.S. PRODUCTION, EXPORTS & IMPORTS
(Thousands of short tons)
Available Supply
U.S. Production (K2O Basis)
U.S. Imports (K2O Basis)
U.S. Exports of Potash Materials (Bulk Basis)
Shipments to U.S. Territories (Bulk Basis)
1930 31 32 33 34 35 36 37 38 1939

50c to $12.25 per ton; technical sulfate of potash, in 200-lb. bags was lowered $1.75 per ton to $36.25; while sulfate of potash-magnesia, in 200-lb. bags, was reduced $1 per ton to a basis of $24.75. All other prices remain unchanged from last season's levels. On orders placed prior to July 20 for spot shipment, or shipment from Europe in equal monthly quantities from Aug 1 to Dec. 31, 12% discount will be allowed. On orders placed prior to Oct. 1 for spot shipment or for shipment in equal monthly quantities from Oct. 1 to Dec. 31, 5% discount will be allowed. The list price will be effective for orders placed after Oct. 1.

Important Price Changes

	June 30	May 31
ADVANCED		
Fish scrap, dried, Menhaden	$3.35	$3.25
DECLINED		
Bone raw, imp.	$23.50	$25.50
Blood, dried, imp.	2.65	2.75
dom., N. Y.	2.50	2.60
Chicago	2.30	2.50
Nitrogenous mat. East	2.30	2.45
Potash, kainit, bulk	12.25	12.75
sulfate, tech., imp., bgs.	36.25	38.00
Potash-magnesia sulfate, imp., bgs.	24.75	25.75
Tankage, grd., N. Y.	2.75	3.00
unground	2.85	3.50
Chicago	2.50	3.25
imported	3.15	3.25

The past month was featured by much lower prices for most of the organic ammoniates. The volume of business placed for raw fertilizer materials generally in the period under review was at a low ebb. This was particularly true in the South.

Superphosphate Output Declines

Superphosphate production in April totaled 237,000 tons compared with 232,000 tons in April '38. A decline from last year in the Northern Area was more than offset by an increase in production at southern plants. Output in April was somewhat below March but the decline was considerably less than the usual seasonal decline for the month. Total production in the first 10 months of the current fiscal year, from July through April, was 14% under the corresponding period of last year. The larger decline has occurred in the North, where production has been off 20%. The drop in the South has amounted to only 9%.

Stocks of superphosphate showed the usual sharp seasonal declines during April, with total stocks at the close of the month nearly a half million tons less than at the beginning. Stocks in base and mixed goods failed to decline as much as usual in April and at the month-end were a little larger than a year earlier. Bulk stocks were 14% lower than at the close of April '38.

May Tag Sales Up 18%

Total fertilizer sales in 17 states in May, amounted to 390,982 tons. This was 18% larger than sales in May '38 and 26% larger than in May '37. The increase over recent years probably reflects the late season, which had also influenced April results.

Aggregate sales in the first 11 months of the current fiscal year, from July through May, were 5,330,734 tons, according to the N.F.A. This represented an increase over the corresponding period of last year of 4%.

An increase of 13% in May over last year in the South was due to marked increases in Virginia, North Carolina, Florida, and Tennessee, which more than offset declines in several of the other states. Total sales in the southern states in the January-May period were somewhat above last year but they were 400,000 tons under the same period of '37.

January-May tag sales in '38 were equivalent to 57% of the total fertilizer consumption for the year. In view of this high ratio and of the showing made by tag sales this year, it now seems likely that 1939 consumption will be fully up to the 1938 level. The upward trend in some of the western states in recent years should continue this year and tonnage in the Northeast does not normally show wide year-to-year fluctuations.

Export, Import Statistics

Exports of fertilizers and fertilizer materials from the U. S. in April totaled 136,328 long tons valued at $1,160,852. Tonnage was 14% less than in April '38 and value was 24% less. Exports for the month were somewhat larger than 2 years ago. Potash salts, land pebble rock, and synthetic sodium nitrate were exported in smaller quantity than a year ago. Total exports in the first 4 months of the year were 22% below the corresponding period of 1938. Declines have been most marked in land pebble rock and nitrogenous materials. Potash exports in the January-April period were larger than last year and considerably above 2 years ago. Export tonnage of high grade hard rock has gone up slightly this year.

April imports, totaling 189,213 long tons valued at $4,447,837, exceeded April of last year by 19% in tonnage and 24% in value. An increase in the nitrogenous group was due largely to larger imports of sodium nitrate, although some of the less important materials were also imported in larger volume. Muriate of potash imports were smaller than last year but other potash materials showed increases. A shipment of 14% kainite was reported, the first in several months.

Ammonium sulfate output in May, amounting to 33,065 tons, was 17% below April's production of 39,635 tons. Compared with May, '38, tonnage of sulfate was only 3% greater this May.

Sulfuric acid production has likewise fallen off sharply during the last few months. April's output, 145,689 tons, was nearly 15% under March totals. In April, '38, the total was about 143,500 tons.

Pigments and Fillers

Titanium Dioxide Reduced 1¢ on July 1

A 3/8c Decline In Lithopone Announced July 3—Carbon Black Prices Unchanged—Red Lead, Litharge Advanced—Casein Stronger—Seasonal Decline in Pigment Shipments—

THE outstanding news in the pigment field last month was a reduction in titanium dioxide effective July 1. The ordinary titanium dioxide was reduced 1c, with bags in carlots at 13c and barrels ¼c higher. Chalk-resistant material was also reduced a similar amount and bags in carlots are quoted at 16c. The usual ¼c differential is made for barrel packing. Titanium pigment with a barium, calcium or magnesium base was lowered 3/8c. The base price now is 5¼c for carlots packed in bags.

Lead prices were advanced on two separate occasions in May and each time the carlot quotation on red lead was raised 5 points. Similar increases were placed in effect for litharge.

Casein prices continue to move upward. Demand has been good and stocks are down to low levels in contrast to what the situation was in this item at the beginning of the current year. A 40c rise was announced for luminous calcium sulfide. The new price is $1.25 in sizable quantities, f.o.b. Chicago. Other price changes of the month included a 5c decline in English red vermilion to a basis of $1.47 per lb., and a ¼c increase in Van Dyke Brown.

Despite some talk in the trade that carbon black prices might be advanced at the mid-year, no change was made by the producers. Similarly quotations on lithopone and zinc oxide remain unchanged.* Nearly all, if not all, of the principal chemical colors are being quoted for the 3rd quarter at the same levels that prevailed during the first half.

A slightly stronger market for ester gum was in evidence in the Metropolitan area. Producers raised quotations ¼c and large quantities are now based on a 6¼c price level. No changes were announced for the markets for driers. Granulated softwood charcoal was increased $2 per ton early in the month for delivery in the Western sections of the country and this was about the only change noted in the fillers and extenders.

Demand for most of the raw paint materials showed definite signs of slackening in the past 30 days. This trend, of course, is seasonal. Movement of paints into consuming channels has been quite satisfactory and as a result there may develop a fair market for raw materials during July. Producers of industrial coatings, on the other hand, have definitely cut production schedules for the next 4 or 5 weeks in view of the seasonal let-down in the automotive centers. A sharp pick-up is confidently expected early in August. July output of cars is expected to drop to some 200,000 units as compared with approximately 310,000 units turned out in June.

* On July 3 a 3/8c decline was announced in lithopone.

Important Price Changes

	June 30	May 31
ADVANCED		
Calcium sulfide, luminous	$1.25	$0.85
Casein, 20-30	.083/4	.071/4
80-100	.091/4	.073/4
Ester gum, N. Y.	.061/4	.06
Litharge	.0635	.0625
Red lead, 95%	.0735	.0725
97%	.0760	.0750
98%	.0785	.0775
Vandyke Brown	.057/8	.055/8
DECLINED		
English red vermilion	$1.47	$1.52
Titanium dioxide, ord., bgs.	.13	.14
Chalk resistant, bgs.	.16	.17
Barium, calcium, magnesium bases, bgs.	.051/4	.055/8

Gain In Paint Sales

May paint, varnish, lacquer and fillers sales, according to the Bureau of the Census, totaled $41,853,977, as compared with $33,999,205 in April, and with $36,827,421 in May a year ago. Sales in the first 5 months reached $159,307,045, an increase from the $147,029,009 reported for the first 5 months of '38.

Favorable Construction Outlook

New construction and engineering work undertaken during May attained the highest level for any May since 1930. Total contracts for May, 1939 amounted to $308,487,000 for the 37 Eastern States, according to F. W. Dodge Corp. This total represents a gain of 9% over May of last year, but shows a decline of 7% from April of this year.

May contracts for total building, comprising residential and non-residential work, amounted to $210,567,000 as compared with $209,061,000 for April and $160,924,000 for May of last year. Contemplated projects for all classes of construction totaled $414,486,000 for May.

Havey, Neumann Promoted

Marshall L. Havey, formerly general sales manager, has been elected a vice-president of New Jersey Zinc Co., N. Y. City. Ralph M. Neumann will serve as general sales manager, in addition to his present duties as manager of company's pigment sales.

R-B-H Dispersions Formed

An Interchemical Corporation subsidiary manufacturing pigment dispersions was consolidated July 1 with R-B-H Lacquer Base Co. of Bound Brook, N. J. New organization, Walter S. Edgar president, is named R-B-H Dispersions, Inc. Mr. Edgar was president of the former Bound Brook firm.

Eakins—Golf Winner

About 160 members of the New York Paint, Varnish and Lacquer Association attended the annual outing, June 8, at Hempstead Golf Club, Hempstead, N. Y. J. Barkley Eakins, J. S. & W. R. Eakins, Inc., won the President's Cup and one year's possession of the Harry I. Hillman Cup with an 82 gross.

United To Expand

The United Color and Pigment division of the Interchemical Corp. has leased additional warehouse space at 504-58 Frelinghuysen Ave., Newark, N. J. This move was announced as necessitated by the expansion of activities taxing the firm's plant on Evergreen Ave., Newark.

Klug Promoted

W. W. Klug, Reichhold Chemicals, Detroit, is now district manager of company's operations in the Milwaukee area.

"The Gangplank"

Dr. Walter A. Schmidt, president, Western Precipitation Co., Los Angeles, sailed June 30 in the *Bremen* to attend the meeting in England of the Society of Chemical Industry. Dr. Wallace P. Cohoe, chemical consultant, sailed June 30 in the *Mauretania* to attend the S. C. I. meeting. He is chairman of the Society's American section.

Irving Taylor, Michigan Alkali, sailed for Europe in the *Queen Mary* recently.

Mr. Charles Orban, Metallurgical Engineer of Products Chimiques de Tessenderloo, Belgium, sailed for Belgium June 29 in the *Normandie* after a two months' visit.

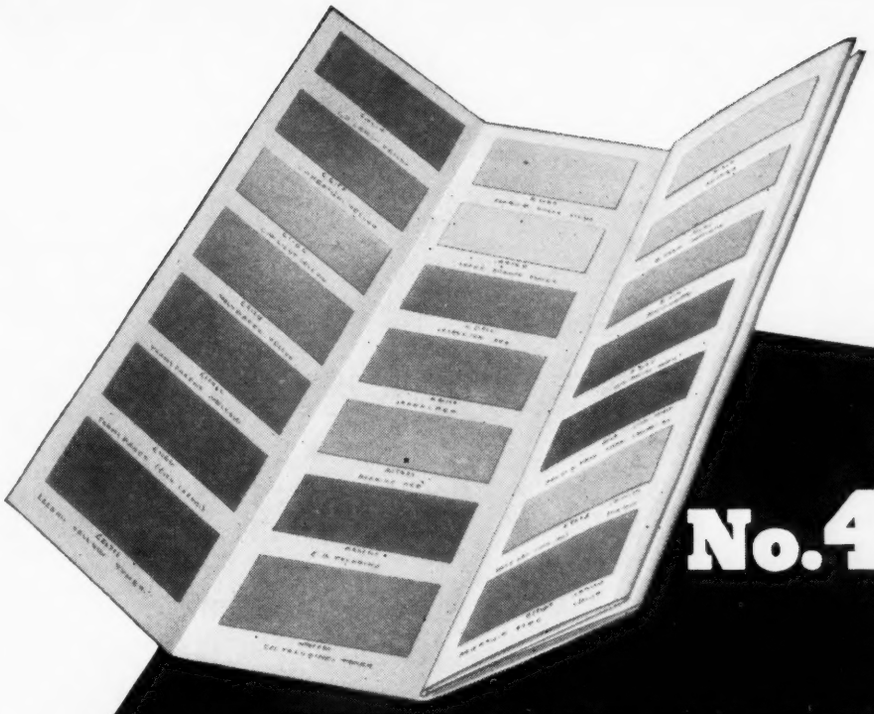
Harvey Farleigh, Merchants Chemical, is in Europe.

M. L. Blanc, president, Acticarbone Corp., N. Y. City, with Mrs. Blanc and their 3 children, sailed June 24 in the *Westernland*. They will make a 2-months' auto tour of France and Belgium.

J. H. Godhaird of the Engineering Division of Société Générale des Minerais, Brussels, arrived June 30 in the *Champlain*, for a visit of several weeks.

M. Quentin of Cie. des Métaux d'Overpelt-Lommel & Corphalie also arrived in the *Champlain*. They will both make their headquarters with Industrial Sales Corp., 60 East 42nd Street, N. Y. City.

F. Requette, Director of the Pharmaceutical Division of Union Chimique Belge, sailed from New York for Belgium in the *Volendam* July 1 after a 5 months' visit to North and South America.



No. 4580

PHTHALOCINE* BLUE

An Outstanding All-Purpose Color

Paint and enamel formulators have found No. 4580 an excellent color in making blue tints that will not change in the can.

In combination with zinc yellow it will produce all the shades of apple, leaf or lettuce green that appear on almost any color card. In addition, No. 4580 possesses excellent light fastness in tints as well as resistance to acids and alkalies. This outstanding chemical color is insoluble in all solvents and non-bleeding in oils.

For over half a century Lavanburg has been meeting formulator's requirements with pigment colors of recognized quality. Your inquiries are invited concerning the application of No. 4580 or any other Lavanburg color to individual requirements.

**Trade name for Lavanburg Phthalocyanine Blues and Greens.*

FRED. L. LAVANBURG COMPANY, INC.

Division of Reichhold Chemicals, Inc.

Factory: BROOKLYN, NEW YORK General Offices: DETROIT, MICH.

Prices Current

Heavy Chemicals, Coal-tar Products, Dye-and-Tanstuffs, Colors and Pigments, Fillers and Sizes, Fertilizer and Insecticide Materials, Petroleum Solvents and Chemicals, Naval Stores, Fats and Oils, etc.

Chemical prices quoted are of American manufacturers for spot New York, immediate shipment, unless otherwise specified. Products sold f. o. b. works are specified as such. Import chemicals are so designated. Resale stocks when a market factor are quoted in addition to maker's prices and indicated "second hands."

Oils are quoted spot New York, ex-dock. Quotations f. o. b. mills, or for spot goods at the Pacific Coast are so designated.

Raw materials are quoted New York, f. o. b., or ex-dock. Materials sold f. o. b. works or delivered are so designated.

The current range is not "bid and asked," but are prices from different sellers, based on varying grades or quantities or both. Containers named are the original packages most commonly used.

Purchasing Power of the Dollar: 1926 Average—$1.00 - 1937 Average $1.10 - Jan. 1939 $1.25 - June 1939 $1.25

		Current Market	1939 Low	1939 High	1938 Low	1938 High
Acetaldehyde, drs. c-l, wks	lb	...	.10	.10	.14	...	.14
Acetaldol, 95%, 50 gal drs wks	lb.	.21	.25	.21	.25	.21	.25
Acetamide, tech, lcl, kgs	lb.	.28	.50	.28	.50	.32	.60
Acetanilid, tech, 150 lb bbls	lb.	...	.22	.22	.29	.29	.32
Acetic Anhydride, drs, f.o.b. wks, frt all'd	lb.	.10½	.11	.10½	.11	.10½	.11
Acetin, tech, drs.	lb.	...	.33	...	.33	...	.33
Acetone, tks, f.o.b. wks, frt all'd	lb.	...	.04¼	.04¼	.04¾	...	.04¾
drs, c-l, f.o.b. wks, frt all'd	lb.	...	.05¾	...	.05¾	...	.05¾
Acetyl chloride, 100 lb cbys	lb.	.55	.68	.55	.68	.55	.68
ACIDS							
Abietic, kgs, bbls	lb.	.08¾	.09	.08¾	.09	.08¾	.10
Acetic, 28%, 400 lb bbls, c-l, wks	100 lbs.	...	2.23	...	2.23	...	2.23
glacial, bbls, c-l, wks	100 lbs.	...	7.62	...	7.62	...	7.62
glacial, USP, bbls, c-l, wks.	100 lbs.	...	10.25	...	10.25	...	10.25
Acetylsalicylic, USP, 225 lb bbls	lb.	...	.50	...	.50	.50	.60
Adipic, kgs, bbls	lb.	...	.72	...	.72	...	.72
Anthranilic, ref'd, bbls	lb.	1.15	1.20	1.15	1.20	1.15	1.20
tech, bbls	lb.	...	.75	...	.75	...	.75
Ascorbic, bot	oz.	2.75	3.00	2.75	3.25	...	...
Battery, cbys, wks	100 lbs.	1.60	2.55	1.60	2.55	1.60	2.55
Benzoic tech, 100 lb kgs	lb.	.43	.47	.43	.47	.43	.47
USP, 100 lb kgs	lb.	.54	.59	.54	.59	.54	.59
Boric, tech, gran, 80 tons, bgs, delv	ton *a*	...	96.00	...	96.00	95.00	96.00
Broenner's, bbls	lb.	...	1.11	...	1.11	...	1.11
Butyric, edible, c-l, wks, cbys	lb.	1.20	1.30	1.20	1.30	1.20	1.30
synthetic, c-l, drs, wks	lb.	...	.22	...	.22	...	.22
wks, lcl	lb.	...	.23	...	.23	...	.23
tks, wks	lb.	...	.21	...	.21	...	.21
Camphoric, drs	lb.	5.50	5.70	5.50	5.70	5.50	5.70
Caproic, normal, drs.	lb.	...	.35	...	.35	...	...
Chicago, bbls	lb.	...	2.10	...	2.10	...	2.10
Chlorosulfonic, 1500 lb drs, wks	lb.	.03½	.05	.03½	.05	.03½	.05
Chromic, 99¾%, drs, delv	lb.	.15¼	.17¼	.15¼	.17¼	.15¼	.17¼
Citric, USP, crys, 230 lb bbls.	lb. *b*	.20	.21½	.20	.22½	.22	.25
anhyd, gran, bbls	lb. *b*	...	.23	.23	.25	.25½	.26½
Cleve's, 250 lb bbls	lb.	...	.57	...	.57	.50	.57
Cresylic, 99%, straw, HB, drs, wks, frt equal	gal.	.49	.50	.49	.64	.63	.91
99%, straw, LB, drs, wks, frt equal	gal.	.55	.56	.55	.71	.69	.94
resin grade, drs, wks, frt equal	lb.	.08¼	.09¼	.08¼	.09½	.09	.11¼
Crotonic, bbls, delv	lb.	.21	.50	.21	.50	.21	1.00
Formic, tech, 140 lb drs	lb.	.10½	.11½	.10½	.11½	.10½	.11½
Fumaric, bbls	lb.	...	.75	...	.75	.60	.75
Fuming, see Sulfuric (Oleum)							
Gallic, tech, bbls	lb.	.70	.73	.70	.73	.70	.79
USP, bbls	lb.	.77	.81	.77	.81	.77	.91
Gamma, 225 lb bbls, wks	lb.	...	.85	...	.85	...	.85
H, 225 lb bbls, wks	lb.	.50	.55	.50	.55	.50	.55
Hydriodic, USP, 47%	lb.	...	2.30	...	2.30	2.20	2.30
Hydrobromic, 34% conet 155 lb cbys, wks	lb.	.42	.44	.42	.44	.42	.44
Hydrochloric, see muriatic							
Hydrocyanic, cyl, wks	lb.	.80	1.30	.80	1.30	.80	1.30
Hydrofluoric, 30%, 400 lb bbls, wks	lb.	.07	.07½	.07	.07½	.07	.07½
Hydrofluosilicic, 35%, 400 bbls, wks	lb.	.09	.09½	.09	.09½	.09	.15
Lactic, 22%, dark, 500 lb bbls	lb.	.02½	.02¾	.02½	.02¾	.02½	.02¾
22%, light ref'd, bbls	lb.	.03½	.03¾	.03½	.03¾	.03½	.03¾
44%, light, 500 lb bbls	lb.	.05½	.05¾	.05½	.05¾	.05½	.05¾
44%, dark, 500 lb bbls	lb.	.06½	.06¾	.06½	.06¾	.06½	.06¾
50%, water white, 500 lb bbls	lb.	.10½	.11½	.10½	.11½	.10½	.11½
USP X, 85%, cbys	lb.	.42	.45	.42	.45	.42	.45
Lauric, drs.	lb.	.11¾	.12¼	.11¾	.12¼	.08½	.12¼
Laurent's, 250 lb bbls	lb.	.45	.46	.45	.46	.45	.46
Levulinic, 5 lb bot wks	lb.	...	2.00	...	2.00	...	2.00
Linoleic, bbls	lb.	...	.20	...	.20	...	.20
Maleic, powd, kgs	lb.	.30	.40	.30	.40	.30	.40
Malic, powd, kgs	lb.	.45	.60	.45	.60	.45	.60
Metanillic, 250 lb bbls	lb.	.60	.65	.60	.65	.60	.65
Mixed, tks, wks	N unit	.06½	.07¼	.06½	.07¼	.06½	.07¼
	S unit	.008	.009	.008	.009	.008	.009
Monochloracetic, tech, bbls	lb.	.16	.18	.16	.18	.16	.18
Monosulfonic, bbls	lb.	1.50	1.60	1.50	1.60	1.50	1.60
Muriatic, 18°, 120 lb cbys, c-l, wks	100 lb.	...	1.50	...	1.50	...	1.50
tks, wks	100 lb.	...	1.00	...	1.00	...	1.00
20°, cbys, c-l, wks	100 lb.	...	1.75	...	1.75	...	1.75
tks, wks	100 lb.	...	1.10	...	1.10	...	1.10
22°, c-l, cbys, wks	100 lb.	...	2.25	...	2.25	...	2.25
tks, wks	100 lb.	...	1.60	...	1.60	...	1.60
CP, cbys	lb.	.06½	.07⅛	.06½	.07⅛	.06½	.07⅛
N & W, 250 lb bbls	lb.	.85	.87	.85	.87	.85	.87
Naphthenic, 240-280 s.v., drs	lb.	.10	.13	.10	.13	.10	.13
Sludges, drs	lb.	...	.05	...	.05	...	.05
Naphthionic, tech, 250 lb bbls	lb.	.60	.65	.60	.65	.60	.65
Nitric, 36°, 135 lb cbys, c-l, wks	100 lb. *c*	...	5.00	...	5.00	...	5.00
38°, c-l, cbys, wks	100 lb. *c*	...	5.50	...	5.50	...	5.50
40°, cbys, c-l, wks	100 lb. *c*	...	6.00	...	6.00	...	6.00
42°, c-l, cbys, wks	100 lb. *c*	...	6.50	...	6.50	...	6.50
CP, cbys, delv	lb.	.11½	.12½	.11½	.12½	.11½	.12½
Oxalic, 300 lb bbls, wks, or N Y	lb.	.10¾	.12	.10¾	.12	.10¾	.12
Phosphoric, 85%, USP, cbys	lb.	.12	.14	.12	.14	.12	.14
50%, acid, c-l, drs, wks	lb.	.06	.08	.06	.08	.06	.08
75%, acid, c-l, drs, wks	lb.	...	.07½	...	.07½	.07½	.10½
Picramic, 300 lb bbls, wks	lb.	.65	.70	.65	.70	.65	.70
Picric, kgs, wks	lb.	.35	.40	.35	.40	.35	.40
Propionic, 98% wks, drs	lb.	...	.22	...	.22	...	.22
80%	lb.	.16	.17½	.16	.17½	.16	.17½
Pyrogallic, tech, lump, pwd, bbls	lb.	...	1.05	...	1.05	...	1.05
cryst, USP	lb.	1.45	1.63	1.45	1.63	1.45	1.63
Ricinoleic, bbls	lb.	...	.35	...	.35	.35	.38
tech, bbls	lb.	...	.13	...	.13	...	.13
Salicylic, tech, 125 lb bbls, wks	lb.	...	.33	...	.33	...	.33
USP, bbls	lb.	.35	.40	.35	.40	.35	.45
Sebacic, tech, drs, wks	lb.	...	nom.	...	nom.	.37	.41
Succinic, bbls	lb.	...	.75	...	.75	...	.75
Sulfanilic, 250 lb bbls, wks	lb.	.17	.18	.17	.18	.17	.18
Sulfuric, 60°, tks, wks	ton	...	13.00	...	13.00	...	13.00
c-l, cbys, wks	100 lb.	...	1.25	...	1.25	...	1.25
66°, tks, wks	ton	...	16.50	...	16.50	...	16.50
c-l, cbys, wks	100 lb.	...	1.50	...	1.50	...	1.50
CP, cbys, wks	lb.	.06½	.07½	.06½	.07½	.06½	.07½
Fuming (Oleum) 20% tks, wks	ton	...	18.50	...	18.50	...	18.50
Tannic, tech, 300 lb bbls	lb.	.40	.47	.40	.47	.40	.47
Tartaric, USP, gran, powd, 300 lb bbls	lb.	.27¼	.27¾	.27¼	.27¾	.24¼	.27¾
Tobias, 250 lb bbls	lb.	.65	.67	.65	.67	.65	.67
Trichloroacetic bottles	lb.	2.00	2.50	2.00	2.50	2.00	2.50
kgs	lb.	...	1.75	...	1.75	...	1.75
Tungstic, tech, bbls	lb.	1.70	1.80	1.70	1.80	1.65	2.00
Vanadic, drs, wks	lb.	1.10	1.20	1.10	1.20	1.10	1.20
Albumen, light flake, 225 lb bbls	lb.	.52	.60	.52	.60	.52	.60
dark, bbls	lb.	.13	.18	.13	.18	.11	.18
egg, edible	lb.	.60	.64	.60	.78	.77	1.15
vegetable, edible	lb.	.74	.78	.74	.78	.74	.78
ALCOHOLS							
Alcohol, Amyl (from Pentane) tks, delv	lb.	...	.101	...	.101	.101	.106
c-l, drs, delv	lb.	...	.111	...	.111	.111	.116
lcl, drs, delv	lb.	...	.121	...	.121	.121	.126
Amyl, secondary, tks, delv	lb.	...	.08½	...	.08½	...	.08½
drs, c-l, delv E, of Rockies	lb.	...	.09½	...	.09½	...	.09½
Benzyl, cans	lb.	.68	1.00	.68	1.00	.68	1.00
Butyl, normal, tks, f.o.b. wks, frt all'd	lb. *d*	...	.07½	.07½	.08½	.08½	.09
c-l, drs, f.o.b. wks, frt all'd	lb. *d*	...	.08½	.08½	.09½	.09½	.10
Butyl, secondary, tks, delv	lb. *d*	...	.06	...	.06	...	.06
c-l, drs, delv	lb. *d*	...	.07	...	.07	...	.07
Capryl, drs, tech, wks	lb.	...	.85	...	.85	...	.85
Cinnamic, bottles	lb.	2.00	2.50	2.00	2.50	2.00	2.50
Denatured, CD, 14, 13, c-l, drs, wks	gal. *e*	.27½	.31½	.27½	.32	.31	.35
tks, East, wks	gal.	...	.21½	.21½	.24	.23	.29
Western schedule, c-l, drs, wks	gal. *e*	...	.34½	.34½	.37	.36	.38
Denatured, SD, No. 1, tks, c-l, drs, wks	gal. *e*	...	.19½	.19½	.22	.22	.27
		...	.25½	.25½	.28	.28	.33

a Powdered boric acid $5 a ton higher in each case; USP $15 higher; *b* Powdered citric is ½c higher; kegs are in each case ½c higher than bbls.; *y* Price given is per gal.

c Yellow grades 25c per 100 lbs. less in each case; *d* Spot prices are 1c higher; *e* Anhydrous is 5c higher in each case; *f* Pure prices are 1c higher in each case.

ABBREVIATIONS—Anhydrous, anhyd; bags, bgs; barrels, bbls; carboys, cbys; carlots, c-l; less-than-carlots, lcl; drums, drs; kegs, kgs; powdered, powd; refined, ref'd; tanks, tks; works, f.o.b., wks.

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ACETALDEHYDE—to make rubber accelerators, rubber antioxidants, synthetic resins, dyestuffs, synthetic organic chemicals, preservatives, and tanning materials.

PARALDEHYDE—to make synthetic resins, plastics, dyestuffs, medicinals, rubber accelerators and antioxidants, and synthetic organic chemicals.

CROTONALDEHYDE—to make dyes, rubber accelerators and antioxidants, solvents for oils, fats, waxes, and petroleum, insecticides and lachrymatory products.

ACETALDOL—to make synthetic resins and plastics, butylene glycol, butadiene, other organic chemicals, ore flotation reagents, and rubber age resisters and antioxidants.

PARALDOL—a very pure polymeric form of acetaldol, used to make similar products as listed above.

Samples and further information on request

NIACET CHEMICALS CORPORATION
NIAGARA FALLS, N. Y.

	Current Market	1939 Low	1939 High	1938 Low	1938 High
Alcohols (continued):					
Diacetone, pure, c-l, drs, delv lb. *f*	...	.09	.09	.11½	... .11½
tech, contract, drs, c-l, delv lb.	...	.08½	.08½	.10½	... .10½
Ethyl, 190 proof, molasses, tks gal. *g*	...	4.46	4.46	4.48½	4.04 4.51½
c-l, drs gal. *g*	...	4.49	4.49	4.54½	4.10 4.59½
c-l, bbls gal. *g*	...	4.53	4.53	4.55½	4.11 4.58½
Furfuryl, tech, 500 lb drs lb.	.25	.35	.25	.35	.25 .35
Hexyl, secondary tks, delv lb.	...	.12	...	.12	... .12
c-l, drs, delv lb.	...	.13	...	.13	... .13
Normal, drs, wks lb.	3.25	3.50	3.25	3.50	3.25 3.50
Isoamyl, prim, cans, wks lb.	...	.32	...	.32	... .32
drs, lcl, delv lb.	...	.27	...	.27	... .27
Isobutyl, ref'd, lcl, drs lb.	...	.09	...	.09	.09 .10
c-l, drs lb.	...	.08½	...	.08½	.08½ .09½
tks lb.	...	.07½	...	.07½	.07½ .08½
Isopropyl, ref'd, 91%, c-l, drs, f.o.b. wks, frt all'd lb.	...	.36	...	.36	... .36
Ref'd 98%, drs, f.o.b. wks, frt all'd gal.	...	.41	...	.41	... .41
Tech 91%, drs, above terms gal.	...	.33½	...	.33½	... .33½
tks, same terms gal.	...	.28½	...	.28½	... .28½
Tech 98%, drs, above terms gal.	...	.37½	...	.37½	... .37½
tks, above terms gal.	...	.32½	...	.32½	... .32½
Spec Solvent, tks, wks gal.	...	.20½	.20½	.23	.23 .28
Aldehyde ammonia, 100 gal drs lb.	.80	.82	.80	.82	.80 .82
Aldehyde Bisulfite, bbls, delv lb.	...	.17	...	.17	... .17
Aldol, 95%, 55 and 110 gal, drs, delv lb.	.11	.12	.11	.20	... .20
Alphanaphthol, crude, 300 lb bbls lb.	...	.52	...	.52	... .52
Alphanaphthylamine, 350 lb bbls lb.	.32	.34	.32	.34	.32 .34
Alum, ammonia, lump, c-l, bbls, wks 100 lb.	3.40	3.65	3.40	3.65	3.40 3.65
delv NY, Phila 100 lb.	...	3.40	...	3.40	... 3.40
Granular, c-l, bbls wks 100 lb.	3.15	3.40	3.15	3.40	3.15 3.40
Powd, c-l, bbls, wks 100 lb.	...	3.55	...	3.55	... 3.55
Chrome, bbls 100 lb.	6.50	6.75	6.50	6.75	6.50 6.75
Potash, lump, c-l, bbls, wks 100 lb.	3.65	3.90	3.65	3.90	3.65 3.90
Granular, c-l, bbls, wks 100 lb.	3.40	3.65	3.40	3.65	3.40 3.65
Powd, c-l, bbls, wks 100 lb.	3.80	4.05	3.80	4.05	3.80 4.05
Soda, bbls, wks 100 lb.	...	3.25	...	3.25	... 3.25
Aluminum metal, c-l, NY 100 lb.	...	20.00	...	20.00	... 20.00
Acetate, 20%, bbls lb.	.07½	.09	.07½	.09	.07½ .10
Basic powd, bbls, delv. lb.	.40	.50	.40	.50	.40 .50
Chloride anhyd, 99%, wks lb.	.07	.12	.07	.12	.07 .12
93%, wks lb.	.05	.08	.05	.08	.05 .08
Crystals, c-l, drs, wks lb.	.06	.06¼	.06	.06¼	.06 .06¼
Solution, drs, wks lb.	.02¾	.03¼	.02¾	.03¼	.02¾ .03¼
Formate, 30% sol bbls, c-l, delv lb.	...	.13	...	.13	... .13
Hydrate, 96%, light, 90 lb bbls, delv lb.	.12½	.13½	.11½	.13	.12 .13
heavy, bbls, wks lb.	.029	.03½	.029	.03½	.029 .03½
Oleate, drs lb.	.16¾	.18½	.16¾	.18½	.16¾ .18½
Palmitate, bbls lb.	...	.23	...	.23	... .23
Resinate, pp., bbls lb.	...	.15	...	.15	... .15
Stearate, 100 lb. bbls lb.	.16	.17	.16	.21	.19 .21
Sulfate, com, c-l, bgs, wks 100 lb.	...	1.15	...	1.15	1.15 1.35
c-l, bbls, wks 100 lb.	...	1.35	...	1.35	1.35 1.55
Sulfate, iron-free, c-l, bgs, wks, 100 lb.	...	2.00	...	2.00	... 2.00
c-l, bbls, wks 100 lb.	...	2.20	...	2.20	... 2.20
Aminoazobenzene, 110 lb kgs lb.	...	1.15	...	1.15	... 1.15
Ammonia anhyd fert com, tks lb.	.04½	.05½	.04½	.05½	.04½ .05½
Ammonia anhyd, 100 lb cyl lb.	.16	.22	.16	.22	.16 .22
26°, 800 lb drs, delv lb.	.02¼	.02½	.02¼	.02½	.02¼ .02½
Aqua 26°, tks, NH cont.	...	.04z	...	.04z	... .05**
tk wagon lb.	...	.02	...	.02	... .02
Ammonium Acetate, kgs lb.	.26	.33	.26	.33	.26 .33
Bicarbonate, bbls, f.o.b. wks 100 lb.	5.15	5.71	5.15	5.71	5.15 5.71
Bifluoride, 300 lb bbls lb.	.14½	.16½	.14½	.16½	.14½ .17
carbonate, tech, 500 lb bbls lb.	.08	.12	.08	.12	.08 .12
Chloride, White, 100 lb bbls, wks 100 lb.	4.45	4.90	4.45	4.90	4.45 4.90
Gray, 250 lb bbls, wks 100 lb.	5.50	6.25	5.50	6.25	5.50 6.25
Lump, 500 lb cks spot lb.	.10½	.11	.10½	11.	.10½ .11
Lactate, 500 lb bbls lb.	.15	.16	.15	.16	.15 .16
Laurate, bbls lb.	...	.23	...	.23	... .23
Linoleate, 80% anhyd, bbls lb.	...	.15	...	.15	... .15
Naphthenate, bbls lb.	...	.17	...	.17	... .17
Nitrate, tech, cks lb.	.036	.0385	.036	.0405	.038 .0405
Oleate, drs lb.	...	.15	...	.15	... .15
Oxalate, neut, cryst, powd, bbls lb.	.19	.20	.19	.20	.19 .22½
Perchlorate, kgs lb.	...	.16	...	.16	... .16
Persulfate, 112 lb kgs lb.	.21	.24	.21	.24	.21 .24
Phosphate, dibasic tech, powd, 325 lb bbls lb.	.07½	.10	.07½	.10	.07½ .10
Ricinoleate, bbls lb.	...	.15	...	.15	... .15
Stearate, anhyd, bbls lb.	...	.23	.23	.24	... .24
Paste, bbls lb.	...	.08	.07½	.08	... .07½

g Grain alcohol 25c a gal. higher in each case. **On a delv. basis.
z On a f.o.b. wks. basis.

	Current Market	1939 Low	1939 High	1938 Low	1938 High
Ammonium (continued):					
Sulfate, dom, f.o.b., bulk ton	...	28.00	...	28.00	26.50 28.50
Sulfocyanide, pure, kgs lb.	...	.55	...	.55	... .55
Amyl Acetate (from pentane) tks, delv lb.	...	.095	.095	.10	.10 .11½
c-l, drs, delv lb.	...	.105	.105	.11	... ...
lcl, drs, delv lb.	...	.115	.115	.112	... ...
tech, drs, delv lb.	...	.11½	.10½	.11½	.11 .10½
Secondary, tks, delv. lb.	...	.08½	...	.08½	... .08½
c-l, drs, delv lb.	...	.09½	...	.09½	... .09½
tks, delv lb.	...	.08½	...	.08½	... .08½
Chloride, norm, drs, wks lb.	.56	.68	.56	.68	.56 .68
mixed, drs, wks lb.	.0565	.0665	.0565	.077	.07 .077
tks, wks lb.	...	.0465	.0465	.06	... .06
Mercaptan, drs, wks lb.	...	1.10	...	1.10	... 1.10
Oleate, lcl, wks, drs lb.	...	.25	...	.25	... .25
Stearate, lcl, wks, drs lb.	...	.26	...	.26	... .26
Amylene, drs, wks lb.	.102	.11	.102	.11	.102 .11
tks, wks lb.	...	.09	...	.09	... .09
Aniline Oil, 960 lb drs and tks lb.	.14½	.17½	.14½	.17½	.14½ .17½
Annatto fine lb.	.34	.37	.34	.37	.34 .37
Anthracene, 80% lb.	...	.55	.55	.75	... .75
Anthraquinone, sublimed, 125 lb bbls lb.	...	.65	...	.65	... .65
Antimony metal slabs, ton lots lb.	...	.12	.11¼	.12	.10¾ .14
Butter of, see Chloride.					
Chloride, soln cbys lb.	...	.17	...	.17	... .17
Needle, powd, bbls lb.	.12	.13	.12	.14	.12½ .16
Oxide, 500 lb bbls lb.	.10	.10½	.10	.12½	.11½ .16½
Salt, 63% to 65%, tins lb.	.25¾	.27	.25¾	.27	.26 .27
Sulfuret, golden, bbls lb.	.22	.23	.22	.23	.22 .23
Archil, conc, 600 lb bbls lb.	.21	.27	.21	.27	.21 .27
Double, 600 lb bbls lb.	.18	.20	.18	.20	.18 .20
Aroclors, wks lb.	.18	.30	.18	.30	.18 .30
Arrowroot, bbls lb.	.08½	.09	.08½	.09	.08½ .09
Arsenic, Metal lb.	.40	.41	.40	.41	.40 .44
Red, 224 lb cs kgs lb.	...	.15¾	...	.15¾	... .15¾
White, 112 lb kgs lb.	.03	.03¾	.03	.03¾	.03 .04
B					
Barium Carbonate precip, 200 lb bgs, wks ton	52.50	62.50	52.50	62.50	52.50 62.50
Nat (witherite) 90% gr, c-l, wks, bgs ton	41.00	43.00	41.00	43.00	41.00 44.00
Chlorate, 112 lb kgs, NY lb.	.16½	.17½	.16½	.17½	.16½ .17½
Chloride, 600 lb bbls, delv, zone 1 ton	77.00	92.00	77.00	92.00	77.00 .92.00
Dioxide, 88%, 690 lb drs lb.	.11	.12	.11	.12	.11 .12
Hydrate, 500 lb bbls lb.	.04¾	.05½	.04¾	.05½	.04¾ .05½
Nitrate, bbls lb.	.06¾	.07¼	.06¾	.07¼	.06¾ .08¼
Barytes, floated, 350 lb bbls c-l, wks ton	...	23.65	...	23.65	... 23.65
Bauxite, bulk, mines ton	7.00	10.00	7.00	10.00	7.00 10.00
Bentonite, c-l, 325 mesh, bgs, wks ton	...	16.00	...	16.00	... 16.00
200 mesh ton	...	11.00	...	11.00	... 11.00
Benzaldehyde, tech, 945 lb. drs, wks lb.	.60	.62	.60	.62	.60 .62
Benzene (Benzol), 90%, Ind. 8000 gal tks, ft all'd gal.	...	.16	...	.16	... .16
90% c-l, drs gal.	...	.21	...	.21	... .21
Ind pure, tks, frt all'd gal.	...	.16	...	.16	... .16
Benzidine Base, dry, 250 lb bbls lb.	.70	.72	.70	.72	.70 .72
Benzoyl Chloride, 500 lb drs lb.	.40	.45	.40	.45	.40 .45
Benzyl Chloride, 95-97% rfd, drs lb.	.30	.40	.30	.40	.30 .40
Tech, drs lb.	.25	.26	.25	.26	.25 .26
Beta-Naphthol, 250 lb bbls, wks lb.	.23	.24	.23	.24	.23 .24
Naphthylamine, sublimed, 200 lb bbls lb.	1.25	1.35	1.25	1.35	1.25 1.35
Tech, 200 lb bbls lb.	.51	.52	.51	.52	.51 .52
Bismuth metal lb.	1.10	1.15	1.05	1.15	1.00 1.10
Chloride, boxes lb.	3.20	3.25	3.20	3.25	3.20 3.25
Hydroxide, boxes lb.	3.15	3.20	3.15	3.20	3.15 3.20
Oxychloride, boxes lb.	...	2.95	...	2.95	... 2.95
Subbenzoate, boxes lb.	3.25	3.30	3.25	3.30	3.25 3.30
Subcarbonate, kgs lb.	1.43	1.46	1.43	1.56	1.13 1.58
Trioxide, powd, boxes lb.	...	3.57	...	3.57	... 3.57
Subnitrate, fibre, drs lb.	1.23	1.26	1.23	1.36	1.03 1.48
Blanc Fixe, 400 lb bbls, wks ton *h*	40.00	75.00	40.00	75.00	40.00 75.00
Bleaching Powder, 800 lb drs, c-l, wks, contract 100 lb.	...	2.00	...	2.00	... 2.00
lcl, drs, wks lb.	2.25	3.60	2.25	3.60	2.25 3.60
Blood, dried, f.o.b., NY unit	...	2.50	2.50	3.50	2.50 3.25
Chicago, high grade unit	...	2.30	2.30	3.35	2.35 3.35
Imported shipt unit	...	2.65	2.65	3.00	2.90 3.45
Blues, Bronze Chinese Milori Prussian Soluble lb.	.36	.37	.36	.37	.36 .37
Ultramarine,* dry, wks, bbls lb.	...	.11	...	.11	... .11
Regular grade, group 1 lb.	...	.16	...	.16	... .16
Special, group 1 lb.	...	.19	...	.19	... .19
Pulp, No. 1 lb.	...	.27	...	.27	... .27
Bone, 4½ + 50% raw, Chicago ton	28.00	29.00	28.00	29.00	25.50 30.00
Bone Ash, 100 lb kgs lb.	.06	.07	.06	.07	.06 .07
Black, 200 lb bbls lb.	.06½	.08¼	.06½	.08¼	.06½ .08¼
Meal, 3% & 50%, imp ton	...	23.50	22.00	24.00	20.50 23.75
Domestic, bgs, Chicago ton	...	27.00	24.00	27.00	16.00 26.00
Borax, tech, gran, 80 ton lots, sacks, delv ton *i*	...	43.00	...	43.00	42.00 43.00
bbls, delv ton *i*	...	53.00	...	53.00	52.00 53.00

h Lowest price is for pulp, highest for high grade precipitated; *i* Crystals $6 per ton higher; USP, $15 higher in each case; *Freight is equalized in each case with nearest producing point.

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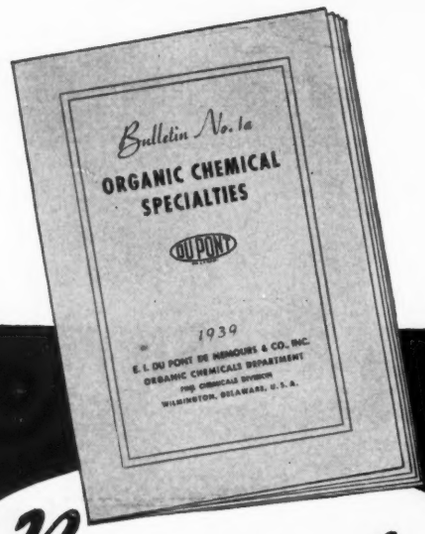

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Prices

	Current Market	1939 Low	1939 High	1938 Low	1938 High
Borax (continued)					
Tech, powd, 80 ton lots, sacks ton	...	47.00	...	47.00	47.00
bbls, del ton	...	57.00	...	57.00	57.00
Bordeaux Mixture, drs lb.	.11	.11½	.11	.11½	.11 .11½
Bromine, cases lb.	.30	.43	.30	.43	.30 .43
Bronze, Al, pwd, 300 lb drs lb.	.90½	.92½	.90½	.92½	.90½ .92½
Gold, blk lb.	.45	.65	.45	.65	.45 .65
Butanes, com 16-32° group 3 tks lb.	.02¼	.03¾	.02¼	.03¾	.02¼ .03¾
Butyl, Acetate, norm drs, frt allowed lb.	...	.08½	.08½	.09½	.09½ .10½
tks, frt allowed lb.	...	.07½	.07½	.08½	.08½ .09
Secondary, tks, frt allowed lb.	...	.058	.058	.06½	.06½ .07
drs, frt allowed lb.	.068	.073	.068	.08	.07½ .08½
Aldehyde, 50 gal drs, wks lb.	.15½	.17½	.15½	.17½	.16½ .17½
Carbinol, norm drs, wks lb.	.60	.75	.60	.75	.60 .75
Crotonate, norm, 55 and 110 gal drs, delv lb.	.75	1.00	.75	1.00	... ...
Lactate lb.	.22½	.23½	.22½	.23½	.22½ .23½
Oleate, drs. frt allowed lb.	...	.25	...	.25	... .25
Propionate, drs lb.	.16½	.17	.16½	.18½	.18 .18½
tks, delv lb.	...	.15½	.15½	.17	... .17
Stearate, 50 gal drs lb.	...	.26	...	.26	... .26
Tartrate, drs lb.	.55	.60	.55	.60	.55 .60
Butyraldehyde, drs, lcl, wks lb.	...	.35½	...	.35½	... .35½
C					
Cadmium Metal lb.	...	.55	.55	.85	.85 1.60
Sulfide, orange, boxes lb.	.75	.85	.75	.90	.80 1.60
Calcium, Acetate, 150 lb bgs c-l, delv 100 lb.	...	1.65	...	1.65	... 1.65
Arsenate, c-l, E. of Rockies, dealers, drs lb.	.06¾	.07¼	.06¾	.07¼	.06¾ .07¼
Carbide, drs lb.	.05	.06	.05	.06	.05 .06
Carbonate, tech, 100 lb bgs c-l lb.	...	1.00	...	1.00	... 1.00
Chloride, flake, 375 lb drs, burlap bgs, c-l, delv ton	...	22.00	...	22.00	22.00 23.50
paper bgs, c-l, delv ton	23.00	36.00	23.00	36.00	23.00 36.00
Solid, 650 lb drs, c-l, delv ton	...	20.00	...	20.00	20.00 21.50
Ferrocyanide, 350 lb bbls wks lb.	...	.17	...	.17	... .17
Gluconate, Pharm, 125 lb bbls lb.	.50	.57	.50	.57	.50 .57
Levulinate, less than 25 bbl lots, wks lb.	...	3.00	...	3.00	... 3.00
Nitrate, 100 lb bgs ton	...	28.00	...	28.00	... 28.00
Palmitate, bbls lb.	.22	.23	.22	.23	.22 .23
Phosphate, tribasic, tech, 450 lb bbls lb.	.06½	.07½	.06½	.07½	.06½ .07½
Resinate, precip, bbls lb.	.13	.14	.13	.14	.13 .14
Stearate, 100 lb bbls lb.	.19	.21	.19	.21	.19 .21
Camphor, slabs lb.	.48½	.51	.48½	.52½	.52 .56
Powder lb.	.48½	.51	.48½	.52½	.52 .56
Carbon Bisulfide, 500 lb drs lb.	.05	.05¾	.05	.05¾	.05 .05¾
Black, c-l, bgs, delv, price varying with zone† lb.	.02¾	.03¾	.02¾	.03¾	.027 .0380
lcl, bgs, f.o.b. whse lb.	...	.06¼	...	.06¼	.05¾ .06¼
cartons, f.o.b. whse lb.	...	.06¼	...	.06¼	... .06¼
cases, f.o.b. whse lb.	...	.07	...	.07	... .07
Decolorizing, drs, c-l lb.	.08	.15	.08	.15	.08 .15
Dioxide, Liq 20-25 lb cyl lb.	.06	.08	.06	.08	.06 .08
Tetrachloride, 55 or 110 gal drs, c-l, delv lb.	.05	.05½	.05	.05½	.05 .06
Casein, Standard, Dom, grd lb.	.08¾	.11¾	.07	.11¾	.06½ .13½
80-100 mesh, c-l, bgs lb.	.09¼	.12½	.07½	.12½	.07 .14
Castor Pomace, 5½ NH_3, c-l, bgs, wks ton	...	16.50	16.50	18.50	18.50 21.00
Imported, ship, bgs ton	...	19.00	19.00	20.00	20.00 21.00
Celluloid, Scraps, ivory cs lb.	.12	.15	.12	.15	.12 .15
Transparent, cs lb.	...	.20	...	.20	... .20
Cellulose, Acetate, 50 lb kgs lb.	...	.36	...	.36	.36 .40
Chalk, dropped, 175 lb bbls lb.	.02¾	.03¾	.02¾	.03¾	.02¾ .03¾
Precip, heavy, 560 lb cks lb.	.02¾	.03¼	.02¾	.03¼	.02¼ .04
Light, 250 lb cks lb.	.03¼	.04	.03¼	.04	.03¼ .04
Charcoal, Hardwood, lump, blk, wks bu.	...	.15	...	.15	... .15
Softwood, bgs, delv* ton	25.00	36.00	23.00	36.00	23.00 34.00
Willow, powd, 100 lb bbls, wks lb.	.06	.07	.06	.07	.06 .07
Chestnut, clarified, tks, wks lb.	...	.01⅝	...	.01⅝	.01⅝ .02125
25%, bbls, wks lb.	...	.02	...	.02	.02 .0225
Pwd, 60%, 100 lb bgs, wks lb.	...	.04½	...	.04½	.04½ .04⅞
China Clay, c-l, blk mines ton	...	7.60	7.00	7.60	... 7.00
Imported, lump, blk ton	22.00	25.00	22.00	25.00	22.00 25.00
Chlorine, cyls, lcl, wks, contract lb.	.07½	.08½	.07½	.08½	.07½ .08½
cyls, c-l, contract lb. *j*	...	.05¼	.05¼	.05½	... .05½
Liq, tk, wks, contract 100 lb.	...	1.75	1.75	2.00	2.00 2.15
Multi, c-l, cyls, wks, cont lb.	...	1.90	1.90	2.15	2.30 2.55
Chloroacetophenone, tins, wks lb.	3.00	3.50	3.00	3.50	3.00 3.50
Chlorobenzene, Mono, 100 lb drs, lcl, wks lb.	.06	.07½	.06	.07½	.06 .07½
Chloroform, tech, 1000 lb drs lb.	.20	.21	.20	.21	.20 .21
USP, 25 lb tins lb.	.30	.31	.30	.31	.30 .31
Chloropicrin, comml cyls lb.	...	.80	...	.80	... .80
Chrome, Green, CP lb.	.21	.25	.21	.25	.21 .25
Yellow lb.	.14½	.15½	.14½	.15½	.14½ .15½

j A delivered price; * Depends upon point of delivery; † New bulk price, tank cars ¼c per lb. less than bags in each zone.

		Current Market	1939 Low	1939 High	1938 Low	1938 High
Chromium Acetate, 8% Chrome, bbls	lb.	.05	.08	.05	.08	.05	.08
Fluoride, powd, 400 lb bbl	lb.	.27	.28	.27	.28	.27	.28
Coal tar, bbls	bbl.	7.50	8.00	7.50	8.00	7.50	8.00
Cobalt Acetate, bbls	lb.	.65	.67	.65	.67	.65	.68
Carbonate tech, bbls	lb.	1.25	1.60	1.25	1.63	...	1.63
Hydrate, bbls	lb.	...	1.78	...	1.78	1.36	1.78
Linoleate, solid, bbls	lb.	...	.33	...	.33	...	.33
paste, 6%, drs	lb.	...	.31	...	.31	...	.31
Oxide, black, bgs	lb.	...	1.67	...	1.67	...	1.67
Resinate, fused, bbls	lb.	...	.13½	...	.13½	...	.13½
Precipitated, bbls	lb.	...	.34	...	.34	...	.34
Cochineal, gray or bk bgs	lb.	.35	.38	.35	.38	.35	.38
Teneriffe silver, bgs	lb.	.36	.39	.36	.39	.36	.39
Copper, metal, electrol 100 lb.		10.00	10.25	10.00	11.25	9.00	11.25
Acetate, normal, bbls, wks	lb.	.21	.23	.21	.23	.21	.23
Carbonate, 400 lb bbls	lb.	.10½	.11½	.10½	.11½	.10¼	.11½
52-54% bbls	lb.	.14½	.15½	.14½	.15½	.1340	.16¾
Chloride, 250 lb bbls	lb.	.12½	.13½	.12½	.14	.12½	.17
Cyanide, 100 lb drs	lb.	...	.34	...	.34	.34	.38
Oleate, precip, bbls	lb.	...	.20	...	.20	...	.20
Oxide, black, bbls, wks	lb.	.15	.16	.15	.17¾	.13½	.17¾
red 100 lb bbls	lb.	.15¾	.16¾	.15¾	.17¾	.15	.19775
Sub-acetate verdigris, 400 lb bbls	lb.	.18	.19	.18	.19	.18	.19
Sulfate, bbls, c-l, wks 100 lb.		...	4.10	4.10	4.50	4.00	4.50
Copperas, crys and sugar bulk c-l, wks	ton		14.00		14.00	12.00	14.00
Corn Sugar, tanners, bbls 100 lb.		3.04	3.14	2.99	3.19	2.95	3.30
Corn Syrup, 42°, bbls 100 lb.		...	3.07	3.02	3.12	2.89	3.16
43°, bbls 100 lb.		...	3.12	3.07	3.17	2.94	3.21
Cotton, Soluble, wet, 100 lb bbls	lb.	.40	.42	.40	.42	.40	.42
Cream Tartar, powd & gran 300 lb bbls	lb.	.22¼	.22¾	.22¼	.23¼	.19¾	.23¼
Creosote, USP, 42 lb cbys	lb.	.45	.47	.45	.47	.45	.47
Oil, Grade 1 tks	gal.	.13½	.14	.13½	.14	.13½	.14
Grade 2	gal.	.122	.132	.122	.132	.122	.132
Cresol, USP, drs	lb.	.09½	.10	.09½	.10½	.10	.12½
Crotonaldehyde, 97%, 55 and 110 gal drs, wks	lb.	.11	.12	.11	.22*	.22*	.30*
Cutch, Philippine, 100 lb bale	lb.	...	.04	.04	.04½	.04	.06
Cyanamid, bgs c-l, frt allowed Ammonia	unit	...	1.15	...	1.15	...	1.15
D							
Derris root 5% rotenone, bbls	lb.	.24	.30	.24	.30	.34	.43
Dextrin, corn, 140 lb bgs f.o.b., Chicago	100 lb.	3.45	3.65	3.40	3.70	3.30	3.75
British Gum, bgs	100 lb.	3.70	3.80	3.65	3.95	3.55	4.00
Potato, Yellow, 220 lb bgs	lb.	.07	.07¾	.07	.08¾	.07¼	.08¾
White, 220 lb bgs, lcl	lb.	.08	.09	.08	.09	.08	.09
Tapioca, 200 bgs, lcl	lb.	...	.0715	...	.0715	.0715	.08
White, 140 lb bgs	100 lb.	3.40	3.60	3.35	3.55	3.30	3.70
Diamylamine, c-l, drs, wks	lb.	.47	.75	.47	.75	.47	.75
Diamylene, drs, wks	lb.	.095	.102	.095	.102	.095	.102
tks, wks	lb.	...	.08½	...	.08½	...	.08½
Diamylether, wks, drs	lb.	.085	.092	.085	.092	.085	.092
tks, wks	lb.	...	.075	...	.075	...	.075
Oxalate, lcl, drs, wks	lb.	...	.30	...	.30	...	.30
Diamylphthalate, drs, wks	lb.	.21	.21½	.19	.21	.19	.21
Diamyl Sulfide, drs, wks	lb.	...	1.10	...	1.10	...	1.10
Diatomaceous Earth, see Kieselguhr.							
Dibutoxy Ethyl Phthalate, drs, wks	lb.	...	.35	...	.35	...	.35
Dibutylamine, lcl, drs, wks	lb.	.50	.52	.50	.55	...	.55
Dibutyl Ether, drs, wks, lcl	lb.	.24½	.25	.24½	.25	.25	.30
Dibutylphthalate, drs, wks, frt all'd	lb.	.19	.19½	.19	.19½	.19	.21
Dibutyltartrate, 50 gal drs	lb.	...	.50	.45	.54	.45	.54
Dichlorethylene, drs	lb.	...	.25	...	.25	...	.25
Dichloroethylether, 50 gal drs, wks	lb.	.15	.16	.15	.16	.15	.16
tks, wks	lb.	...	.14	...	.14	...	.14
Dichloromethane, drs, wks	lb.	...	.23	...	.23	...	.23
Dichloropentanes, drs, wks	lb.	no prices		no prices		...	...
tks, wks	lb.	no prices		no prices		...	...
Diethanolamine, tks, wks	lb.	...	.23	...	.23	...	.23
Diethylamine, 400 lb drs	lb.	2.75	3.00	2.75	3.00	2.75	3.00
Diethylaniline, 850 lb drs	lb.	.40	.52	.40	.52	.40	.50
Diethyl Carbinol, drs	lb.	.60	.75	.60	.75	.60	.75
Diethylcarbonate, com drs	lb.	.31¾	.35	.31¾	.35	.31¾	.35
Diethylorthotoluidin, drs	lb.	.64	.67	.64	.67	.64	.67
Diethylphthalate, 1000 lb drs	lb.	.19	.19½	.19	.19½	.19	.19½
Diethylsulfate, tech, drs, wks, lcl	lb.	.13	.14	.13	.14	.13	.14
Diethyleneglycol, drs	lb.	.16	.17	.16	.17	.16	.17
Mono ethyl ethers, drs	lb.	.15	.16	.15	.16	.15	.16
tks, wks	lb.	...	.14	...	.14	...	.14
Mono butyl ether, drs	lb.	.23	.24	.23	.24	.23	.24
tks, wks	lb.	...	.22	...	.22	...	.22
Diethylene oxide, 50 gal drs, wks	lb.	.20	.24	.20	.24	.20	.24
Diglycol Laurate, bbls	lb.	.16	.17	.16	.23	...	.27½
Oleate, bbls	lb.	...	.13	.13	.20	...	.21
Stearate, bbls	lb.	...	.20	.20	.28	...	.27½
Dimethylamine, 400 lb drs, pure 25 & 40% sol 100% basis	lb.	...	1.00	...	1.00	...	1.00
Dimethylaniline, 340 lb drs	lb.	.23	.24	.23	.24	.23	.27
Dimethyl Ethyl Carbinol, drs	lb.	.60	.75	.60	.75	.60	.75
Dimethyl phthalate, drs, wks, frt allowed	lb.	...	.19	...	.19	...	.19
Dimethylsulfate, 100 lb drs	lb.	.45	.50	.45	.50	.45	.50
Dinitrobenzene, 400 lb bbls	lb. *k*	.18	.19	.16	.19	.16	.19

k Higher price is for purified material; * These prices were on a delivered basis.

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Dinitrochlorobenzene
Glauber's Salt

Prices

	Current Market	1939 Low	1939 High	1938 Low	1938 High
Dinitrochlorobenzene, 400 lb bbls ..... lb.	...	.14	.13½	.14	.13½ .14
Dinitronaphthalene, 350 lb bbls ..... lb.	.35	.38	.35	.38	.35 .38
Dinitrophenol, 350 lb bbls lb.	.22	.23	.22	.24	.23 .24
Dinitrotoluene, 300 lb bbls lb.	...	.15½	...	.15½	... .15½
Diphenyl, bbls ..... lb.	.15	.25	.15	.25	.15 .25
Diphenylamine ..... lb.	.31	.32	.32	.32	.31 .32
Diphenylguanidine, 100 lb drs ..... lb.	.35	.37	.31	.37	.31 .32
Dip Oil, see Tar Acid Oil.					
Divi Divi pods, bgs shipmt ton	...	nom.	...	nom.	... nom.
Extract ..... lb.	.05¾	.06¾	.05¾	.06¾	.05 .06¾
E					
Egg Yolk, dom., 200 lb cases lb.	.60	.63	.60	.69	.60 .69
Imported ..... lb.	...	nom.	..	nom.	.62 .68
Epsom Salt, tech, 300 lb bbls c-l, NY ..... 100 lb.	1.90	2.10	1.90	2.10	1.90 2.10
USP, c-l, bbls ..... 100 lb.	...	2.10	...	2.10	... 2.10
Ether, USP anaesthesia 55 lb drs ..... lb.	.22	.23	.22	.23	.22 .23
(Conc) ..... lb.	.09	.10	.09	.10	.09 .10
Isopropyl 50 gal drs ... lb.	.07	.08	.07	.08	.07 .08
tks, frt allowed ..... lb.	...	.06	...	.06	... .06
Nitrous conc bottles ... lb.	...	.68	...	.68	... .68
Synthetic, wks, drs .. lb.	.08	.09	.08	.09	.08 .09
Ethyl Acetate, 85% Ester tks, frt all'd ..... lb.	...	.051	...	.051	.051 .05½
drs, frt all'd ..... lb.	...	.061	...	.061	.061 .06½
99%, tks, frt all'd ... lb.	...	.0585	...	.0585	.0585 .06¾
drs, frt all'd ..... lb.	...	.0685	...	.0685	.0685 .07¾
Acetoacetate, 110 gal drs lb.	...	.27½	...	.27½	... .27½
Benzylaniline, 300 lb drs lb.	.86	.88	.86	.88	.86 .88
Bromide, tech, drs ..... lb.	.50	.55	.50	.55	.50 .55
Cellullose, drs, wks, frt all'd ..... lb.	.45	.50	.45	.50	.45 1.00
Chloride, 200 lb drs ... lb.	.22	.24	.22	.24	.22 .24
Chlorocarbonate, cbys .. lb.	...	.30	...	.30	... .30
Crotonate, drs ..... lb.	.75	1.00	.75	1.25	1.00 1.25
Formate, drs, frt all'd .. lb.	.27	.28	.27	.28	.27 .28
Lactate, drs, wks ..... lb.	...	.33	...	.33	... .33
Oxalate, drs, wks ..... lb.	.30	.34	.30	.34	.30 .34
Oxybutyrate, 50 gal drs, wks ..... lb.	.30	.30½	.30	.30½	.30 .30½
Silicate, drs, wks ..... lb.	...	.77	...	.77	... .77
Ethylene Dibromide, 60 lb drs ..... lb.	.65	.70	.65	.70	.65 .70
Chlorhydrin, 40%, 10 gal cbys chloro, cont .... lb.	.75	.85	.75	.85	.75 .85
Anhydrous ..... lb.	...	.75	...	.75	... .75
Dichloride, 50 gal drs, wks lb.	.0545	.0994	.0545	.0994	.0545 .0994
Glycol, 50 gal drs, wks .. lb.	.16	.20	.16	.21	.17 .21
tks, wks ..... lb.	...	.15	.15	.16	... .16
Mono Butyl Ether, drs, wks ..... lb.	.18	.22	.18	.22	.20 .21
tks, wks ..... lb.	...	.17	.17	.19	... .19
Mono Ethyl Ether, drs, wks ..... lb.	.15	.16	.15	.17	.16 .17
tks, wks ..... lb.	...	.14	...	.15	... .15
Mono Ethyl Ether Acetate, drs, wks ..... lb.	.13	.14	.13	.14	... .14
tks, wks ..... lb.	...	.12	.12	.13	... .13
Mono Methyl Ether, drs wks ..... lb.	.17	.18	.17	.22	.18 .22
tks, wks ..... lb.	...	.16	...	.17	... .17
Oxide, cyl ..... lb.	.50	.55	.50	.55	.50 .55
Ethylideneaniline ..... lb.	.45	.47½	.45	.47½	.45 .47½
F					
Feldspar, blk pottery .... ton	17.00	19.00	17.00	19.00	17.00 19.00
Powd, blk, wks ..... ton	14.00	14.50	14.00	14.50	14.00 14.50
Ferric Chloride, tech, crys, 475 lb bbls ..... lb.	.05	.07½	.05	.07½	.05 .07½
sol, 42° cbys ..... lb.	.06¼	.06½	.06¼	.06½	.06¼ .06½
Fish Scrap, dried, unground wks ..... unit *l*	...	3.25	3.00	3.25	2.75 3.30
Acid, Bulk, 6 & 3%, delv Norfolk & Baltimore basis ..... unit *m*	...	2.35	2.35	2.50	2.50 2.50
Fluorspar, 98% bgs ..... lb.	30.00	31.60	30.00	33.00	... 33.00
Formaldehyde, USP, 400 lb bbls, wks ..... lb.	.05¾	.06¼	.05¾	.06¼	.05¾ .06¼
Fossil Flour ..... lb.	.02½	.04	.02½	.04	.02½ .04
Fullers Earth, blk, mines ton	10.00	11.00	10.00	11.00	10.00 11.00
Imp powd, c-l, bgs ... ton	23.00	30.00	23.00	30.00	23.00 30.00
Furfural (tech) drs, wks lb.	.10	.15	.10	.15	.10 .15
Furfuramide (tech) 100 lb. drs ..... lb.	...	.30	...	.30	... .30
Fusel Oil, 10% impurities lb.	.12½	.14	.12½	.14	.12½ .14
Fustic, crystals, 100 lb boxes ..... lb.	.22	.26	.22	.26	.22 .26
Liquid 50°, 600 lb bbls lb.	.09½	.13	.09½	.13	.09½ .13
Solid, 50 lb boxes ..... lb.	.17½	.19½	.17½	.19½	.17½ .19½
G					
G Salt paste, 360 lb bbls . lb.	.45	.47	.45	.47	.45 .47
Gambier, com 200 lb bgs lb.	.06¾	.07¾	.06¾	.07¾	.06¾ .07¾
Singapore cubes, 150 lb bgs ..... 100 lb.	.08½	.09½	.08¼	.09½	.08½ .11
Gelatine, tech, 100 lb cs . lb.	.42	.43	.42	.50	.45 .50
Glauber's Salt, tech, c-l, bgs, wks* ..... 100 lb.	.95	1.15	.95	1.15	.95 1.15
Anhydrous, see Sodium Sulfate					

l + 10; *m* + 50; * Bbls. are 20c higher.

Current

		Current Market	1939 Low	1939 High	1938 Low	1938 High
Glue, bone, com grades, c-l bgs	lb.	.11½	.11½	.13½	.13	.16½
Better grades, c-l, bgs	lb.	.15 .16½	.15	.16½	.14½	.16½
Glycerin, CP, 550 lb drs	lb.	... .12½	...	.12½	.12½	.16
Dynamite, 100 lb drs.	lb.	... nom.	...	.09	.12¾	.16
Saponification, drs	lb.	.09 .10	.08½	.10	.08½	.11¼
Soap Lye, drs	lb.	.07¾ .07⅞	.07½	.07⅞	.07½	.10¼
Glyceryl Bori-Borate, bbls	lb.	... .40	...	.40	...	.40
Monoricinoleate, bbls	lb.	... .27	...	.27	...	.27
Monostearate, bbls	lb.	... .30	...	.30	...	.30
Oleate, bbls	lb.	... .22	...	.22	...	.22
Phthalate	lb.	... .37	...	.37	...	.37
Glyceryl Stearate, bbls	lb.	... .18	...	.18	...	.18
Glycol Bori-Borate, bbls	lb.	... .22	.22	.23	...	.26
Phthalate, drs	lb.	... .38	.38	.40	...	.40
Stearate, drs	lb.	... .24	.24	.27½	...	.27½
GUMS						
Gum Aloes, Barbadoes	lb.	.85 .90	.85	.90	.85	.90
Arabic, amber sorts	lb.	.10¼ .10¾	.09	.11	.09	.12
White sorts, No. 1, bgs	lb.	23 .24	.23	.24	.23	.28
No. 2, bgs	lb.	21 .22	.21	.22	.21	.26
Powd, bbls	lb.	.12½ .13⅜	.12½	.14	.12	.16
Asphaltum, Barbadoes (Manjak) 200 lb bgs, f.o.b., NY	lb.	.02½ .10½	.02½	.10½	.02½	.10½
California, f.o.b. NY, drs	ton	29.00 55.00	29.00	55.00	29.00	55.00
Egyptian, 200 lb cases, f.o.b. NY	lb.	.12 .15	.12	.15	.12	.15
Benzoin Sumatra, USP, 120 lb cases	lb.	.17 .18	.17	.21	.15	.25
Copal, Congo, 112 lb bgs, clean, opaque	lb.	... .18¼	.18¼	.18¾	.18¾	.19¼
Dark amber	lb.	... .07⅛	...	.07⅛	.07⅛	.08⅞
Light amber	lb.	... .11¼	...	.11¼	.11¼	.13¼
Copal, East India, 180 lb bgs						
Macassar pale bold	lb.	... .11⅜	...	.11⅜	.11⅜	.13
Chips	lb.	... .05⅜	...	.05⅜	...	.05⅜
Dust	lb.	... .03¾	.03¼	.04	.03½	.04⅛
Nubs	lb.	... .09½	...	.09½	.09⅛	.10⅜
Singapore, Bold	lb.	... .14	.14	.14½	.14½	.15¼
Chips	lb.	... .05⅞	.05⅝	.06½	.04¾	.05⅜
Dust	lb.	... .03¾	.03¼	.04	.03¼	.04⅛
Nubs	lb.	... .09⅝	.09⅝	.10	.10	.10⅜
Copal Manila, 180-190 lb baskets, Loba A	lb.	... .11	.10½	.11	.10½	.12
Loba B	lb.	... .10¾	.09¾	.10¾	.10¼	.11⅝
Loba C	lb.	... .10⅜	.09	.10⅜	.09¾	.11¼
DBB	lb.	... .08¼	.07⅞	.08¼	.07⅞	.08¾
Dust	lb.	... .05½	.05⅛	.05½	.05⅛	.06⅝
MA sorts	lb.	... .06⅜	.05⅞	.06⅜	.05⅞	.07¼
Copal Pontianak, 224 lb cases, bold genuine	lb.	... .15¼	...	.15¼	.15¼	.16½
Chips	lb.	... .07⅛	.07⅛	.08¼	.08¼	.10¼
Mixed	lb.	... .13⅜	.13⅜	.14	...	.14
Nubs	lb.	... .10½	.10½	.11⅜	.11⅜	.12⅞
Split	lb.	... .12	.12	.13½	.13½	.13⅞
Damar Batavia, 136 lb cases A	lb.	... .20	...	.20	.20	.25½
B	lb.	... .18½		.18½	.18½	.24
C	lb.	... .14⅛	.14⅛	.14⅞	.14⅞	.20¼
D	lb.	... .12¼	.12¼	.13½	.13⅛	.17½
A/D	lb.	... .13⅛	.13⅛	.14½	.14½	.20⅜
A/E	lb.	... .11⅜	.11⅜	.12¼	.12¼	.17¼
E	lb.	... .07⅜	...	.07⅜	.07⅜	.08½
F	lb.	... .07¼	...	.07¼	...	.07¼
Singapore, No. 1	lb.	... .13¾	.13¼	.15¼	.15¼	.21⅛
No. 2	lb.	... .10½	.10½	.11¼	.10⅜	.15⅜
No. 3	lb.	... .05⅜	.05¼	.05⅝	.05	.05¾
Chips	lb.	... .09¼		.09¼	.09¼	.13½
Dust	lb.	... .05⅝	.05¼	.05⅝	.05	.05¾
Seeds	lb.	... .07⅜	...	.07⅜	.07⅜	.09½
Elemi, cns, c-l,	lb.	... .08⅛	...	.08⅛	.08⅛	.09½
Ester	lb.	.06¼ .07	.06	.07	.06¼	.08½
Gamboge, pipe, cases	lb.	.55 .60	.55	.60	.60	.80
Powd, bbls	lb.	.60 .65	.60	.65	.65	.85
Ghatti, sol. bgs	lb.	.11 .15	.11	.15	.11	.15
Karaya, bbls, bxs, drs,	lb.	.14 .23	.14	.23	...	...
Kauri, NY Brown XXX, cases	lb.	.60 .60½	.60	.60½	.60	.60½
BX	lb.	... .38	...	.38	...	.38
B1	lb.	... .28	...	.28	...	.28
B2	lb.	... .24	...	.24	...	.24
B3	lb.	... .18½	...	.18½	...	.18½
Pale XXX	lb.	... .61	...	.61	...	.61
No. 1	lb.	... .41	...	.41	...	.41
No. 2	lb.	... .24	...	.24	...	.24
No. 3	lb.	... .17¾	...	.17¾	...	.17¾
Kino, tins	lb.	3.50 nom.	2.50	3.50	2.00	2.75
Mastic	lb.	.55 .56	.55	.56	.55	.56
Sandarac, prime quality, 200 lb bgs & 300 lb cks	lb.	.20 .21	.15	.21	.19	.26
Senegal, picked bags	lb.	.25 .27	.25	.27	.23	.27
Sorts	lb.	.10¼ .10¾	.09¼	.10¾	.09¼	.12
Thus, bbls	280 lbs.	14.50 14.75	13.50	14.75	13.50	14.25
Tragacanth, No. 1, cases	lb.	2.25 2.35	2.25	2.45	2.40	3.00
No. 2	lb.	1.90 1.95	1.90	2.35	2.30	2.75
No. 3	lb.	1.60 1.65	1.60	1.95	1.90	2.70
Yacca, bgs	lb.	.03½ .04½	.03½	.04½	.03½	.04½
H						
Helium, cyl (200 cu. ft.)	cyl.	... 25.00	...	25.00	...	25.00
Hematine crystals, 400 lb bbls	lb.	.18 .34	.18	.34	.18	.34
Hemlock, 25%, 600 lb bbls. wks	lb.	.03 .03¼	.03	.03¼	.03	.03¼
tks	lb.	... .02⅝	...	.02⅝	.02⅝	.02¾

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Prices

		Current Market	1939 Low	1939 High	1938 Low	1938 High
Hexalene, 50 gal drs, wks	lb.	.30	...	.30	...	.30
Hexane, normal 60-70° C.						
Group 3, tks	gal.	.10½	...	.10½	...	.10½
Hexamethylenetetramine, powd, drs	lb.	.32	.32	.36	.35	.36
Hexyl Acetate, secondary, delv, drs	lb.	.13	.13½	.13	.13½	.13	.13½
tks	lb.	...	.12	...	.12	...	.12
Hoof Meal, f.o.b. Chicago unit		...	2.65	2.65	2.85	2.35	3.35
Hydrogen Peroxide, 100 vol, 140 lb cbys	lb.	.19½	.20	.19½	.20	.19½	.20
Hydroxylamine Hydrochloride	lb.	...	3.15	...	3.15	...	3.15
Hypernic, 51°, 600 lb bbls	lb.	.13	.16	.13	.21	.16	.21
I							
Indigo, Bengal, bbls	lb.	...	2.40	...	2.40	...	2.40
Synthetic, liquid	lb.	.16½	.19	.16½	.19	.16½	.19
Iodine, Resublimed, jars	lb.	...	1.75	...	1.75	1.50	1.75
Irish Moss, ord, bales	lb.	.10	.11	.10	.11	.10	.11
Bleached, prime, bales	lb.	.19	.20	.19	.20	.19	.20
Iron Acetate Liq. 17°, bbls							
delv	lb.	.03	.04	.03	.04	.03	.04
Chloride see Ferric Chloride.							
Nitrate, coml, bbls	100 lb.	2.32	3.11	2.32	3.11	2.32	3.11
Isobutyl Carbinol (128-132° C)							
drs, wks	lb.	.33	.34	.33	.34	.33	.34
tks, wks	lb.	...	.32	...	.32	...	.32
Isopropyl Acetate, tks, frt all'd	lb.	...	.0510	...	.0510	.0510	.05½
drs, frt all'd	lb.	.061	.066	.061	.066	.061	.07
Ether, see Ether, isopropyl.							
Keiselguhr, dom bags, c-l, Pacific Coast	ton	22.00	85.00	22.00	85.00	22.00	85.00
L							
Lead Acetate, f.o.b. NY, bbls, White, broken	lb.	...	.10	...	.10	.10	.11
cryst, bbls	lb.	...	.10	...	.10	.10	.11
gran, bbls	lb.	...	.10¾	...	.10¾	.10¾	.11¾
powd, bbls	lb.	...	.10¾	...	.10¾	.10¾	.11¾
Arsenate, East, drs	lb.	.10	.10¼	.10	.11½	.11	.13½
Linoleate, solid, bbls	lb.	...	.19	...	.19	...	.19
Metal, c-l, NY	100 lb.	4.85	4.90	4.75	5.10	4.00	5.10
Nitrate, 500 lb bbls, wks	lb.	.10	.11½	.10	.11½	.10	.11½
Oleate, bbls	lb.	.18½	.20	.18½	.20	.18½	.20
Red, dry, 95% Pb_3O_4,							
delv	lb.	...	.0735	.07¼	.08	.06½	.08
97% Pb_3O_4, delv	lb.	...	.076	.07½	.076	.06¾	.081
98% Pb_3O_4, delv	lb.	...	.0785	.07¾	.0785	.07	.0835
Resinate, precip, bbls	lb.	...	.16½	...	.16½	...	.16½
Stearate, bbls	lb.	...	.25	.22	.25	.22	.23
Titanate, bbls, c-l, f.o.b. wks, frt all'd	lb.	.11	.11½	.11	.11½	.11	.11½
White, 500 lb bbls, wks	lb.	...	.07	...	.07	.06	.07
Basic sulfate, 500 lb bbls, wks	lb.	...	.06¼	...	.06¼	.05¼	.06¼
Lime, chemical quicklime, f.o.b., wks, bulk	ton	7.00	8.00	7.00	8.00	7.00	8.00
Hydrated, f.o.b. wks	ton	8.50	12.00	8.50	12.00	8.50	12.00
Lime Salts, see Calcium Salts							
Lime sulfur, dealers, tks	gal.	.08	.11½	.08	.11½	.08	.11½
drs	gal.	.11	.16	.11	.16	.11	.16
Linseed Meal, bgs	ton	...	37.50	37.50	42.00	39.00	45.00
Litharge, coml, delv, bbls	lb.	...	.0635	.06¼	.0635	.05½	.066
Lithopone, dom, ordinary, delv, bgs	lb.	...	.03¾	.03¾	.04⅛	.04⅛	.04⅝
bbls	lb.	...	.04	.04	.04⅜	.04⅜	.04⅞
High strength, bgs	lb.	...	.05⅛	...	.05⅛	.05⅛	.06⅛
bbls	lb.	...	.05⅞	...	.05⅞	.05⅞	.06⅜
Titanated, bgs	lb.	...	.05⅛	...	.05⅛	.05⅛	.06⅛
bbls	lb.	...	.05⅞	...	.05⅞	.05⅞	.06⅜
Logwood, 51°, 600 lb bbls	lb.	.09½	.11½	.09½	.11½	.09½	.11½
Solid, 50 lb boxes	lb.	.15	.19	.15	.19	.15	.19
Sticks	ton	24.00	25.00	24.00	25.00	24.00	25.00
M							
Madder, Dutch	lb.	.22	.25	.22	.25	.22	.25
Magnesite, calc, 500 lb bbls	ton	60.00	65.00	60.00	65.00	60.00	65.00
Magnesium Carb, tech, 70 lb bgs, wks	lb.	...	.06¼	.05¾	.06½	.05¾	.07
Chloride flake, 375 lb drs, c-l, wks	ton	39.00	42.00	39.00	42.00	39.00	42.00
Fluosilicate, crys, 400 lb bbls, wks	lb.	.10	.10½	.10	.10½	.10	.10½
Oxide, calc tech, heavy bbls, frt all'd	lb.	.25	.30	.25	.30	.25½	.30½
Light, bbls above basis	lb.	.20	.25	.20	.25	.20	.25½
USP Heavy, bbls, above basis	lb.	.25	.30	.25	.30	.25	.30½
Palmitate, bbls	lb.	.33	nom.	.33	nom.	...	.33
Silicofluoride, bbls	lb.	.09½	.10½	.09½	.10½	.09½	.10½
Stearate, bbls	lb.	.21	.24	.21	.24	.21	.24
Manganese acetate, drs	lb.	...	.26½	...	.26½	...	.26½
Borate, 30%, 200 lb bbls	lb.	.15	.16	.15	.16	.15	.16
Chloride, 600 lb cks	lb.	.08¼	.08¾	.07½	.12	.09	.12
Dioxide, tech (peroxide), paper bags, c-l	ton	...	47.50	...	47.50	47.50	62.50
Hydrate, bbls	lb.	...	.32	...	.32	...	.32
Linoleate, liq. drs	lb.	.18	.19¼	.18	.19¼	.18	.19¼
solid, precip, bbls	lb.	...	.19	...	.19	...	.19
Resinate, fused, bbls	lb.	.08¼	.08½	.08¼	.08½	.08¼	.08½
precip, drs	lb.	...	.12	...	.12	...	.12
Sulfate, tech, anhyd, 90-95%, 550 lb drs	lb.	.07	.07½	.07	.07½	.07	.07½

		Current Market	1939 Low	1939 High	1938 Low	1938 High
Mangrove, 55%, 400 lb bbls	lb.	.04	...	.04	...	.04
Bark, African	ton	25.25	23.00	26.00	23.00	24.50
Mannitol, pure cryst, cs, wks	lb.	1.05	1.05	1.20	1.15	1.45
commercial grd, 250 lb bbl	lb.	.46	.57	...	...	...
Marble Flour, blk	ton	12.00	13.00	12.00	13.00	12.00	13.00
Mercury chloride (Calomel)	lb.	...	1.52	1.36	1.52	1.18	1.59
Mercury metal...76 lb. flasks		88.00	90.00	80.00	97.00	73.00	84.50
Mesityl Oxide, f.o.b. dest., tks.	lb.	...	.10½	.10½	.20	...	...
drs, c.l.	lb.	...	.11½	.11½	.21	...	...
drs, l.c.l.	lb.	...	.12	.12	.21½	...	...
Meta-nitro-aniline	lb.	.67	.69	.67	.69	.67	.69
Meta-nitro-paratoluidine 200 lb bbls	lb.	1.30	1.40	1.30	1.55	1.45	1.55
Meta-phenylene diamine 300 lb bbls	lb.	.80	.84	.80	.84	.80	.84
Meta-toluene-diamine 300 lb bbls	lb.	.65	.67	.65	.67	.65	.67
Methanol, denat, grd, drs, c-l, frt all'd	gal.	...	.46	.41	.46	.30	.41
tks, frt all'd	gal.	...	.40	.35	.40	.25	.35
Pure, drs, c-l, frt all'd	gal.	...	.38	...	.38	...	.38
tks	gal.	...	.33	..	.33	...	.33
95%, tks	gal.	...	.31	...	.31	...	.31
97%, tks	gal.	...	.32	...	.32	...	.32
Methyl Acetate, tech, tks, delv	lb.	...	.06	.06	.06½	...	.06½
55 gal drs, delv	lb.	.07	.08	.07	.08	.07½	.08
C.P. 97-99%, tks, delv	lb.	...	.06¼	...	.06¼	.06¼	.07
55 gal drs, delv	lb.	.07¼	.07¾	.07¼	.07¾	.07¼	.08½
Acetone, frt all'd, drs	gal. *p*	.33	.39	.30	.39	.30	.40½
tks, frt all'd, drs	gal. *p*	...	.28	.25	.29	.25	.32½
Synthetic, frt all'd, east of Rocky M., drs	gal. *p*	.38	.41	.38	.41	.38	.51
tks, frt all'd	gal.	...	.31½	...	.31½	.31½	.39½
West of Rocky M., frt all'd, drs	gal. *p*	...	.42	...	.42	.42	.46
tks, frt all'd	gal. *p*	...	.35	...	.35	.35	.39½
Anthraquinone	lb.	...	.83	...	.83	...	.83
Butyl Ketone, tks	lb.	...	.10½	...	.10½	...	.10½
Chloride, 90 lb cyl	lb.	.32	.40	.32	.40	.32	.40
Ethyl Ketone, tks, frt all'd	lb.	...	.05	...	.05	.05	.06
50 gal drs, frt all'd c-l	lb.	...	.06	...	.06	.06	.07
Formate, drs, frt all'd	lb.	.35	.36	.35	.36	.35	.36
Hexyl Ketone, pure, drs	lb.	...	.60	...	.60	...	.60
Lactate, drs, frt all'd	lb.	...	.30	...	.30	...	.30
Mica, dry grd, bgs, wks	lb.	...	30.00	...	30.00	30.00	35.00
Michler's Ketone, kgs	lb.	..	2.50	...	2.50	...	2.50
Monoamylamine, c-l, drs, wks	lb.	.52	1.00	.52	1.00	.52	1.00
Monobutylamine, drs, wks	lb.	.52	.65	.62	.65	...	.65
Monochlorobenzene, see Chlorobenzene, mono							
Monoethanolamine, tks, wks	lb.	...	.23	...	.23	...	.23
Monomethylamine, drs, frt all'd, E. Mississippi, c-l	lb.	...	.65	...	.65	...	.65
Monomethylparaminosulfate, 100 lb drs	lb.	3.75	4.00	3.75	4.00	3.75	4.00
Morpholine, drs 55 gal, lcl wks	lb.	...	.75	...	...	...	...
Myrobalans 25%, liq bbls	lb.	.03¾	.04¼	.03¾	.04¼	.03¾	.04¼
50% Solid, 50 lb boxes	lb.	.04¼	.05	.04¼	.05	.04⅜	.06¼
J1 bgs	ton	...	26.00	24.00	26.00	23.50	30.00
J2 bgs	ton	...	20.00	19.00	20.00	17.00	22.00
R2 bgs	ton	...	16.75	16.75	17.25	17.00	22.00

N

Naphtha, v.m.&p. (deodorized) see petroleum solvents.							
Naphtha, Solvent, water-white, tks	gal.	...	.26	...	.26	.26	.31
drs, c-l	gal.	...	.31	...	.31	.31	.36
Naphthalene, dom, crude bgs, wks	lb.	2.25	2.85	2.25	2.85	2.25	2.85
Imported, cif, bgs	lb.	...	1.55	1.50	1.85	1.40	2.25
Balls, flakes, pks	lb.	...	.06½	...	.06½	.06½	.08
Balls, ref'd, bbls, wks	lb.	...	.05¾	...	.05¾	.05¾	.07¼
Flakes, ref'd, bbls, wks	lb.	...	.05¾	...	.05¾	.05¾	.07¼
Nickel Carbonate, bbls	lb.	.36	.37½	.36	.37½	.36	.37½
Chloride, bbls	lb.	.18	.20	.18	.20	.18	.20
Metal ingot	lb.	...	.35	...	.35	...	.35
Oxide, 100 lb kgs, NY	lb.	.35	.37	.35	.37	.35	.37
Salt, 400 lb bbls, NY	lb.	.13	.13½	.13	.13½	.13	.13½
Single, 400 lb bbls, NY	lb.	.13	.13½	.13	.13½	.13	.13½
Nicotine, 40%, drs, sulfate, 55 lb drs	lb.	...	.70	.70	.76	...	.76
Nitre Cake, blk	ton	...	16.00	...	16.00	...	16.00
Nitrobenzene, redistilled, 1000 lb drs, wks	lb.	.08	.10	.08	.10	.08	.10
tks	lb.		.07	.07	.07½	...	.07½
Nitrocellulose, c-l, l-c-l, wks	lb.	.22	.29	.22	.29	.22	.29
Nitrogen Sol. 45½% ammon., f.o.b. Atlantic & Gulf ports, tks, unit ton		...	1.04		1.04	1.01	1.04
Nitrogenous Mat'l, bgs, imp unit		...	2.50	2.40	2.50	2.35	2.65
dom, Eastern wks	unit	...	2.30	2.30	2.50	2.50	2.75
dom, Western wks	unit	...	1.90	1.90	2.25	2.20	2.35
Nitronaphthalene, 550 lb bbls	lb.	.24	.25	.24	.25	.24	.25
Nutgalls Alleppo, bgs	lb.	...	.23	.22	.23	.23	.23

O

Oak Bark Extract, 25%, bbls	lb.	...	.03½	.03⅛	.03½	...	.03⅛
tks	lb.	...	.02¾	...	.02¾	...	.02¾
Octyl Acetate, tks, wks	lb.	...	.15	.15	.17	.16	.17

a Country is divided in 4 zones, prices varying by zone; *p* Country is divided into 4 zones. Also see footnote directly above; *q* Naphthalene quoted on Pacific Coast F.A.S. Phila., or N. Y.

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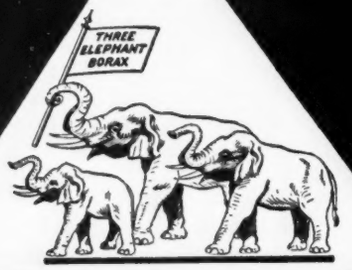

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Orange-Mineral Phenylhydrazine Hydrochloride — Prices

	Current Market	1939 Low	1939 High	1938 Low	1938 High
Orange-Mineral, 1100 lb cks NY ..... lb.	...	.10¼	...	.10¼	.09½ .10½
Orthoaminophenol, 50 lb kgs lb.	2.15	2.25	2.15	2.25	2.15 2.25
Orthoanisidine, 100 lb drs lb.	.70	.74	.70	.74	.70 .74
Orthochlorophenol, drs ... lb.	...	.32	...	.32	.32 .75
Orthocresol, 30.4°, drs, wks lb.	.14½	.15	.14½	.17½	.13½ .17½
Orthodichlorobenzene, 1000 lb drs ..... lb.	.06	.07	.06	.07	.06 .07
Orthonitrochlorobenzene, 1200 lb drs, wks ..... lb.	.15	.18	.15	.18	.15 .18
Orthonitroparachlorphenol, tins ..... lb.	...	.75	...	.75	... .75
Orthonitrophenol, 350 lb drs ..... lb.	.85	.90	.85	.90	.85 .90
Orthonitrotoluene, 1000 lb drs. wks ..... lb.	...	.09	.08	.10	.08 .10
Orthotoluidine, 350 lb bbls, l-c-l ..... lb.	...	.19	.16	.19	16 .17
Osage Orange, cryst, bbls lb.	.19	.25	.17	.25	.17 .25
51° liquid ..... lb.	...	.09	.07	.09	.07 .08
P					
Paraffin, rfd, 200 lb bgs 122-127° M P ..... lb.	.03¾	.039	.03¾	.039	.03¾ .04½
128-132° M P ..... lb.	.04	.0435	.04	.0435	.04 .049
133-137° M P ..... lb.	...	.0465	...	.0465	.0465 .05¾
Para aldehyde, 99%, tech, 110-55 gal drs, wks lb.	.10	.11¼	.10	.16*	.16* .18*
Aminoacetanilid, 100 lb kgs ..... lb.	...	.85	...	.85	... .85
Aminohydrochloride, 100 lb kgs ..... lb.	1.25	1.30	1.25	1.30	1.25 1.30
Aminophenol, 100 lb kgs lb.	...	1.05	...	1.05	... 1.05
Chlorophenol, drs ..... lb.	.30	.45	.30	.45	.30 .45
Dichlorobenzene, 200 lb drs, wks ..... lb.	.11	.12	.11	.12	.11 .12
Formaldehyde, drs, wks lb.	.34	.35	.34	.35	.34 .35
Nitroacetanilid, 300 lb bbls ..... lb.	.45	.52	.45	.52	.45 .52
Nitroaniline, 300 lb bbls, wks ..... lb.	.45	.47	.45	.47	.45 .47
Nitrochlorobenzene, 1200 lb drs, wks ..... lb.	.15	.16	.15	.16	.15 .16
Nitro-orthotoluidine, 300 lb bbls ..... lb.	2.75	2.85	2.75	2.85	2.75 2.85
Nitrophenol, 185 lb bbls lb.	.35	.37	.35	.37	.35 .37
Nitrosodimethylaniline, 120 lb bbls ..... lb.	.92	.94	.92	.94	.92 .94
Nitrotoluene, 350 lb bbls lb.	...	.30	.30	.35	... .35
Phenylenediamine, 350 lb bbls ..... lb.	1.25	1.30	1.25	1.30	1.25 1.30
Toluenesulfonamide, 175 lb bbls. ..... lb.	.70	.75	.70	.75	.70 .75
tks, wks ..... lb.	...	.31	...	.31	... .31
Toluenesulfonchloride, 410 lb bbls, wks ..... lb.	.20	.22	.20	.22	.20 .22
Toluidine, 350 lb bbls, wks ..... lb.	.48	.50	.48	.58	.56 .58
Paris Green, dealers, drs lb.	.23	.26	.23	.26	.23 .26½
Pentane, normal, 28-38° C, group 3, tks ..... gal.	...	.08½	...	.08½	... .08½
drs, group 3 ..... gal.	.11½	.16	.11½	.16	.11½ .16
Perchlorethylene, 100 lb drs, frt all'd ..... lb.	.08	.08¾	.08	.10½	... .10½
Petrolatum, dark amber, bbls ..... lb.	.02⅝	.02¾	.02⅝	.02¼	.02⅝ .03⅛
Light, bbls ..... lb.	.03⅛	.03⅜	.03⅛	.03⅜	.03⅛ .03⅜
Medium, bbls ..... lb.	.02⅞	.03⅛	.02⅞	.03⅛	.02⅞ .03⅛
Dark green, bbls ..... lb.	.02½	.02¾	.02½	.02¾	.02½ .02¾
Red, bbls ..... lb.	.02½	.03⅜	.02½	.03⅜	.02½ .03⅜
White, lily, bbls ..... lb.	.05¼	.07⅛	.05¼	.07⅛	.05¼ .07⅛
White, snow, bbls ..... lb.	.06¼	.08⅛	.06¼	.08⅛	.06¼ .08⅛
Petroleum Ether, 30-60°, group 3, tks ..... gal.	...	.13	...	.13	... .13
drs, group 3 ..... gal.	.14	.17	.14	.17	.14 .17
PETROLEUM SOLVENTS AND DILUENTS					
Cleaners naphthas, group 3, tks, wks ..... gal.	.06⅜	.06⅝	.06⅜	.06⅝	.06⅜ .07⅜
East Coast, tks, wks gal.	...	.10	...	.10	... .10
Hydrogenated, naphthas, frt all'd East, tks ..... gal.	...	.16	...	.16	... .16
No. 2, tks ..... gal.	...	.18	...	.18	... .18
No. 3, tks ..... gal.	...	.16	...	.16	... .16
No. 4, tks ..... gal.	...	.18	...	.18	... .18
Lacquer diluents, tks, East Coast ..... gal.		.09	.09	.12½	.12 .12½
Group 3, tks ..... gal.	.07⅜	.07⅝	.07⅜	.07⅝	.07⅜ .08⅜
Naphtha, V.M.P., East, tks wks ..... gal.	...	.09	.09	.10	.09½ .10
Group 3, tks, wks .. gal.	.06⅜	.06⅝	.06⅜	.06⅝	.06⅜ .07⅜
Petroleum thinner, 43-47, East, tks, wks ..... gal.	...	.08½	.08½	.10	.08½ .10
Group 3, tks, wks .. gal.	.05⅜	.05⅝	.05⅜	.05⅝	.05⅜ .06⅜
Rubber Solvents, stand grd. East, tks, wks ..... gal.	...	.09	.09	.10	.09½ .10
Group 3 tks, wks ... gal.	.06⅜	.06⅝	.06⅜	.06⅝	.06⅜ .07⅜
Stoddard Solvent, East, tks, wks ..... gal.	...	.08½	.08½	.10	.09½ .10
Group 3, tks, wks .. gal.	.05⅞	.06⅛	.05⅞	.06⅛	.05⅞ .06⅞
Phenol, 250-100 lb drs ... lb.	.14	.15	.14	.15½	.14½ .15½
tks, wks ..... lb	...	.13	.13	.13½	... .13½
Phenyl-Alpha-Naphthylamine, 100 lb kgs ..... lb.	...	1.35	...	1.35	... 1.35
Phenyl Chloride, drs ..... lb.	...	.17	...	.17	... .17
Phenylhydrazine Hydrochloride, com ..... lb.	...	1.50	...	1.50	... 1.50

* These prices were on a delivered basis.

	Current Market	1939 Low	1939 High	1938 Low	1938 High
Phloroglucinol, tech, tins..lb.	15.00	16.50	15.00	16.50	15.00	16.50
CP, tins .....lb.	20.00	22.00	20.00	22.00	20.00	22.00
Phosphate Rock, f.o.b. mines						
Florida Pebble, 68% basis ton	...	1.85	...	1.85	...	1.85
70% basis .....ton	...	2.35	...	2.35	...	2.35
72% basis .....ton	...	2.85	...	2.85	...	2.85
75-74% basis .....ton	...	3.85	...	3.85	...	3.85
75% basis .....ton	...	5.50	...	5.50	...	5.50
Tennessee, 72% basis..ton	...	4.50	...	4.50	...	4.50
Phosphorus Oxychloride 175 lb cyl .....lb.	.16	.20	.16	.20	.16	.20
Red, 110 lb cases .....lb.	40	.44	.40	.44	.40	.44
Sesquisulfide, 100 lb cs..lb.	.38	.44	.38	.44	.38	.44
Trichloride, cyl .....lb.	.15	.18	.15	.18	.15	.18
Yellow, 110 lb cs, wks .lb.	.24	.30	.24	.30	.24	.30
Phthalic Anhydride, 100 lb drs, wks .....lb.	...	.14½	...	.14½	...	.14½
Pine Oil, 55 gal drs or bbls						
Destructive dist .....lb.	46	.48	.46	.48	.46	.55
Steam dist wat wh bbls gal.	...	.59	...	.59	...	.59
tks .....gal.	...	.54	...	.54	...	.54
Pitch Hardwood, wks ...ton	18.25	18.75	18.25	18.75	18.25	18.75
Coaltar, bbls, wks ....ton	..	19.00	..	19.00	..	19.00
Burgundy, dom, bbls, wks lb.	.05½	.06½	.05½	.06½	.05½	.06½
Imported .....lb.	.15	.16	.15	.16	.15	.16
Petroleum, see Asphaltum in Gums' Section.						
Pine, bbls .....bbl.	6.00	6.25	6.00	6.25	5.75	6.25
Stearin, drs .....lb.	.03	.04½	.03	.04½	.03	.04½
Platinum, ref'd .....oz.	32.00	35.00	32.00	35.00	30.00	39.00
POTASH						
Potash, Caustic, wks, sol..lb.	.06¼	.06½	.06¼	.06½	.06¼	.06½
flake .....lb.	.07	.07⅜	.07	.07⅜	.07	.07⅜
Liquid, tks .....lb.	...	.02⅞	...	.02⅞	...	.02⅞
Manure Salts, imported 30% basis, blk ....unit	...	.58½	...	.58½	...	.58½
Potassium Abietate, bbls..lb.	...	.09	...	.09	.08	.13
Acetate, tech, bbls, delv lb.	...	.26	...	.26	.26	.28
Bicarbonate, USP, 320 lb bbls .....lb.	...	.18	...	.18	...	.18
Bichromate Crystals, 725 lb cks* .....lb.	.08¾	.09¼	.08¾	.09¼	.08¾	.09¼
Binoxalate, 300 lb bbls..lb.	...	.23	...	.23	...	.23
Bisulfate, 100 lb kgs....lb.	.15½	.18	.15½	.18	.15½	.18
Carbonate, 80-85% calc 800 lb cks .....lb.	.06½	.07	.06½	.07	.06½	.07
liquid, tks .....lb.	...	.02⅞	...	.02⅞	...	.02⅞
drs, wks .....lb.	.03	.03½	.03	.03½	.03	.03½
Chlorate crys, 112 lb kgs, wks .....lb.	.09¼	.09½	.09¼	.09½	.09¼	.09½
gran, kgs .....lb.	.12	.13	.12	.13	.12	.13
powd, kgs .....lb.	.08½	.08¾	.08½	.08¾	.08½	.08¾
Chloride, crys, bbls ....lb.	.04	.04¾	.04	.04¾	.04	.04¾
Chromate, kgs .....lb.	.19	.28	.19	.28	.19	.28
Cyanide, 110 lb cases...lb.	.50	.55	.50	.55	.50	.57½
Iodide, 250 lb bbls ....lb.	...	1.13	...	1.13	.93	1.13
Metabisulfite, 300 lb bbls lb.	.11	.12½	.11	.13½	.12	.15
Muriate, bgs, dom, blk unit	...	.53½	...	.53½	...	.53½
Oxalate, bbls .....lb.	.25	.26	.25	.26	.25	.26
Perchlorate, kgs, wks...lb.	.09	.10½	.09	.10½	.09	.11½
Permanganate, USP, crys, 500 & 1000 lb drs, wks lb.	.18½	.19½	.18½	.19½	.18½	.19½
Prussiate, red, bbls ....lb.	.30½	.34	.30½	.34	.30½	.37
Yellow, bbls .....lb.	.14	.15	.14	.16	.15	.16
Sulfate, 90% basis, bgs ton	...	36.25	36.25	38.00	...	38.00
Titanium Oxalate, 200 lb bbls .....lb.	.35	.40	.35	.40	.35	.40
Pot & Mag Sulfate, 48% basis bgs .....ton	...	24.75	24.75	25.75	...	25.75
Propane, group 3, tks ....lb.	.03	.04⅜	.03	.04⅜	.03	.04⅜
Putty, coml, tubs ....100 lb.	...	3.00	...	3.00	2.25	3.00
Linseed Oil, kgs ....100 lb.	...	4.50	...	4.50	4.00	4.65
Pyrethrum, conc liq:						
2.4% pyrethrins, drs, frt all'd .....gal.	6.45	6.60	5.75	6.60	5.00	6.75
3.6% pyrethrins, drs, frt all'd .....gal.	9.55	9.70	8.45	9.70	7.65	9.95
Flowers, coarse, Japan, bgs .....lb.	.29	.29½	.26	.29½	.18	.28½
Fine powd, bbls .....lb.	.30	.31	.27	.31	.19	.30
Pyridine, denat, 50 gal drs gal.	...	1.63	...	1.63	1.53	1.63
Refined, drs .....lb.	...	.50	...	.50	.45	.50
Pyrites, Spanish cif Atlantic ports, blk .....unit	.12	.13	.12	.13	.12	.13
Pyrocatechin, CP, drs, tins lb.	2.15	2.75	2.15	2.75	2.15	2.75
Q						
Quebracho, 35% liq tks ..lb.	...	.02⅞	.02⅞	.03⅜	.03	.03⅜
450 lb bbls, c-l .....lb.	...	.04	.04	.04½	.03½	.04½
Solid, 63%, 100 lb bales cif .....lb.	...	.04	...	.04	...	.04
Clarified, 64%, bales..lb.	...	.04¼	...	.04¼	...	.04¼
Quercitron, 51 deg liq, 450 lb bbls .....lb	.07½	.08½	.07½	.08½	.06	.08½
Solid, drs .....lb.	.10	.12	.10	.12	.10	.12
R						
R Salt, 250 lb bbls, wks .lb.	.52	.55	.52	.55	.52	.55
Resorcinol tech, cans.....lb.	.75	.80	.75	.80	.75	.80
Rochelle Salt, cryst .....lb.	.18¾	.19¼	.17¾	.19¼	.15	.18¼
Powd, bbls .....lb.	.17¾	.18¼	.16¾	.18¼	.16	.18½
Rosin Oil, bbls, first run gal.	.45	.47	.45	.47	.45	.60
Second run .....gal.	.47	.49	.47	.49	.47	.62
Third run, drs .....gal.	.51	.53	.51	.53	.51	.66

* Spot price is ½c higher.

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Rosins
Sodium Naphthionate

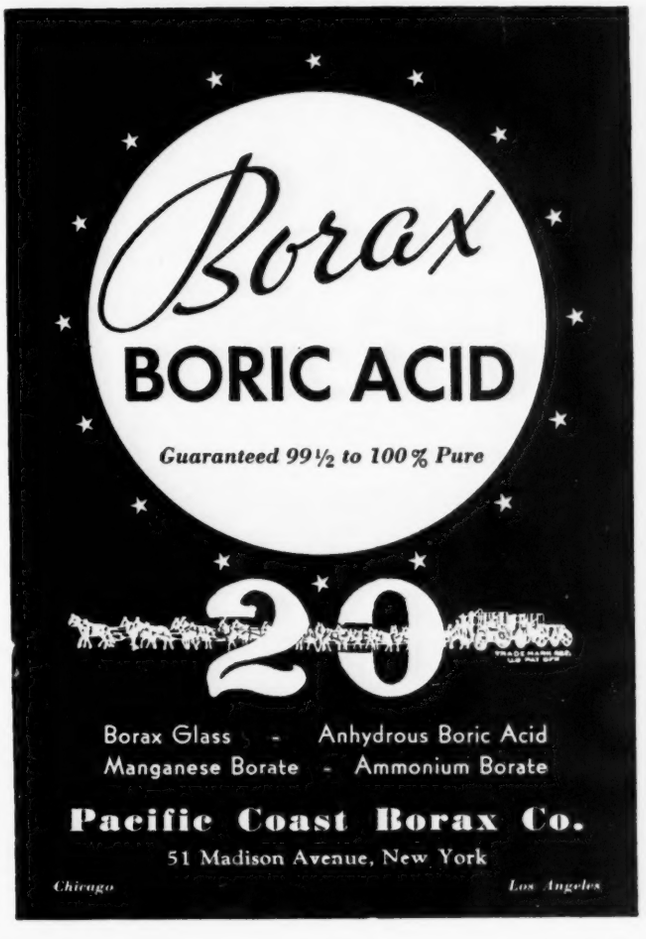
Prices

		Current Market	1939 Low	1939 High	1938 Low	1938 High
Rosins 600 lb bbls, 280 lb unit ex. yard NY:***						
B	...	4.60	4.60	5.10	4.65	6.00
D	...	5.05	4.95	5.30	4.75	6.00
E	...	5.35	5.20	5.40	4.90	6.00
F	...	5.75	5.50	5.77½	5.05	7.00
G	...	6.00	5.75	7.00	5.25	7.05
H	...	6.25	5.75	7.10	5.25	7.15
I	...	6.25	5.77½	7.12½	5.25	7.15
K	...	6.25	5.80	7.15	5.25	7.25
M	...	6.35	5.90	7.25	5.25	7.40
N	...	6.45	6.75	7.40	6.20	7.50
WG	...	7.10	7.10	7.70	6.75	8.45
WW	...	7.50	7.50	8.50	7.55	9.15
Rosins, Gum, Savannah (280 lb unit):**						
B	...	3.35	3.25	3.75	3.25	4.60
D	...	3.80	3.55	4.00	3.50	4.60
E	...	4.10	3.80	4.10	3.55	4.60
F	...	4.50	4.10	4.50	3.90	5.60
G	...	4.75	4.40	5.60	4.10	5.65
H	...	5.00	4.40	5.70	4.20	5.75
I	...	5.00	4.40	5.72½	4.20	5.85
K	...	5.00	4.40	5.75	4.20	6.00
M	...	5.10	4.40	5.85	4.20	6.15
N	...	5.20	5.20	6.00	4.80	6.20
WG	...	5.85	5.80	6.30	5.40	7.05
WW	...	6.25	6.25	7.10	6.10	7.75
X	...	6.25	6.25	7.10	6.10	7.75
Rosin, Wood, c-l, FF grade, NY	4.00	6.17½	5.35	5.25	5.05	6.40
Rotten Stone, bgs mines..ton	25.50	37.50	22.50	37.50	22.50	35.00
Imported, lump, bbls ..lb.	...	.14	...	.14	.12	.14
Powdered, bbls .....lb.	.08½	.10	.08½	.10	.08½	.10
S						
Sago Flour, 150 lb bgs...lb.	.02½	.03½	.02½	.03½	.02½	.03¾
Sal Soda, bbls, wks ...100 lb.	...	1.20	...	1.20	...	1.20
Salt Cake, 94-96%, c-l, wks ton	19.00	25.00	19.00	25.00	19.00	23.00
Chrome, c-l, wks .....ton	11.00	12.00	11.00	12.00	11.00	12.00
Saltpetre, gran, 450-500 lb bbls .....lb.	.06½	.069	.06½	.069	.06½	.069
Cryst, bbls .....lb.	.07½	.0865	.07½	.0865	.07½	.0865
Powd, bbls .....lb.	.07½	.079	.07½	.079	.07½	.079
Satin, White, pulp, 550 lb bbls .....lb.	.01¼	.01½	.01¼	.01½	.01¼	.01½
Schaeffer's Salt, kgs .....lb.	.46	.48	.46	.48	.46	.48
Shellac, Bone dry, bbls..lb. *r*	.18	.19	.18	.20	.16½	.20
Garnet, bgs .....lb.	.12½	.13	.12½	.13	.12½	.15
Superfine, bgs .....lb. *s*	.10	.10½	.10	.11½	.11	.13½
T. N., bgs .....lb. *s*	.09½	.10	.09½	.11	.10½	.12½
Silver Nitrate, vials .....oz.	.28⅜	.30⅝	.28⅜	.33½	.33½	.34⅞
Slate Flour, bgs, wks...ton	9.00	10.00	9.00	10.00	9.00	10.00
Soda Ash, 58% dense, bgs, c-l, wks .....100 lb.	...	1.10	...	1.10	...	1.10
58% light, bgs .....100 lb.	...	1.08	...	1.08	...	1.08
blk .....100 lb.	...	.90	...	.90	...	.90
paper bgs .....100 lb.	...	1.05	...	1.05	...	1.05
bbls .....100 lb.	...	1.35	...	1.35	...	1.35
Caustic, 76% grnd & flake, drs .....100 lb.	...	2.70	...	2.70	...	2.70
76% solid, drs ....100 lb.	...	2.30	...	2.30	...	2.30
Liquid sellers, tks ..100 lb.	...	1.97½	...	1.97½	...	1.97½
Sodium Abietate, drs ....lb.	...	.11	...	.11	.10	.13
Acetate, 60% tech, gran, powd, flake, 450 lb bbls wks .....lb.	.04	.05	.04	.05	.04	.05
anhyd, drs, delv .....lb.	...	.08¼	...	.08¼	...	.08¼
Alginate, drs .....lb.	.71	.95	.70	.95	.69	.70
Antimoniate, bbls .....lb.	.11½	.12	.11½	.12½	.12	.15¼
Arsenate, drs .....lb.	.08	.08½	.08	.08½	.08	.08½
Arsenite, liq, drs .....gal.	...	.35	.30	.35	.30	.33
Dry, gray, drs, wks..lb.	.07½	.09½	.07½	.09½	.07½	.09½
Benzoate, USP kgs ...lb.	.46	.48	.46	.48	.46	.48
Bicarb, powd, 400 lb bbl, wks .....100 lb.	...	1.85	...	1.85	...	1.85
Bichromate, 500 lb cks, wks* .....lb.	.06¾	.07¼	.06¾	.07¼	.06¾	.07¼
Bisulfite, 500 lb bbls, wks lb.	.033	.036	.03¼	.036	.03	.036
35-40% sol bbls, wks 100 lb.	1.40	1.80	1.40	1.80	1.40	1.80
Chlorate, bgs, wks .....lb.	.06¼	.07½	.06¼	.07½	.06¼	.07½
Cyanide, 96-98%, 100 & 250 lb drs, wks .....lb.	.14	.15	.14	.15	.14	.17½
Diacetate, 33-35% acid, bbls, lcl, delv .....lb.	...	.09	...	.09	...	.09
Fluoride, white 90%, 300 lb. bbls, wks .....lb.	.07¼	.08¾	.07¼	.08¾	.07½	.08¼
Hydrosulfite, 200 lb bbls, f.o.b. wks .....lb.	.16	.17	.16	.17	.16	.17
Hyposulfite, tech, pea crys 375 lb bbls, wks 100 lb.	...	2.80	...	2.80	2.50	2.80
Tech, reg cryst, 375 lb bbls, wks .....100 lb.	2.45	2.80	2.45	2.80	2.40	2.80
Iodide, jars .....lb.	...	2.10	...	2.10	1.90	2.10
Metal, drs, 280 lbs ....lb.	...	.19	...	.19	...	.19
Metanilate, 150 lb bbls..lb.	.41	.42	.41	.42	.41	.42
Metasilicate, gran, c-l, wks .....100 lb.	...	2.20	...	2.20	2.15	2.20
cryst, drs, c-l, wks 100 lb.	...	2.90	...	2.90	2.75	2.90
Monohydrated, bbls ....lb.	...	.023	...	.023	...	.023
Naphthenate, drs .....lb.	.12	.19	.12	.19	.12	.19
Naphthionate, 300 lb bbl lb.	...	.50	.50	.54	.52	.54

r Bone dry prices at Chicago 1c higher; Boston ½c; Pacific Coast 2c; Philadelphia deliveries f.o.b. N. Y.; refined 6c higher in each case; *s* T. N. and Superfine prices quoted f.o.b. N. Y. and Boston; Chicago prices 1c higher; Pacific Coast 3c; Philadelphia f.o.b. N. Y. * Spot price is ⅛c higher. ** June 30. *** June 30.

	Current Market	1939 Low	1939 High	1938 Low	1938 High
Sodium (continued):					
Nitrate, 92%, crude, 200 lb bgs, c-l, NY ton	... 28.30	... 28.30		... 28.30	
100 lb bgs ton	... 29.00	... 29.00		... 29.00	
Bulk ton	... 27.00	... 27.00		... 27.00	
Nitrite, 500 lb bbls lb.	.06¾ .11½	.06¾ .11½		.06¾ .11½	
Orthochlorotoluene, sulfonate, 175 lb bbls, wks lb.	.25 .27	.25 .27		.25 .27	
Orthosilicate, 300 lb drs, c.l. lb.	... 2.90	2.90 2.90		2.90 2.90	
Perborate, drs, 400 lbs lb.	.14¾ .15¼	.14¾ .15¼		.14¾ .15¼	
Peroxide, bbls, 400 lb lb.	... .17	... .17		... .17	
Phosphate, di-sodium, tech, 310 lb bbls, wks 100 lb.	... 2.05	... 2.05		... 2.05	
bgs, wks 100 lb.	... 1.85	... 1.85		... 1.85	
Tri-sodium, tech, 325 lb bbls, wks 100 lb.	... 2.20	... 2.20		... 2.20	
bgs, wks 100 lb.	... 2.00	... 2.00		... 2.00	
Picramate, 160 lb kgs lb.	.65 .67	.65 .67		.65 .67	
Prussiate, Yellow, 350 lb bbl, wks lb.	.09½ .10	.09½ .10		.09 .11½	
Pyrophosphate, anhyd, 100 lb bbls f.o.b. wks frt eq lb.	... .0530	... .0530		.0530 .10	
Sesquisilicate, drs, c-l, wks 100 lb.	... 2.80	... 2.80		2.80 3.00	
Silicate, 60°, 55 gal drs, wks 100 lb.	1.65 1.70	1.65 1.70		1.65 1.70	
40°, 55 gal drs, wks 100 lb.	... .80	... .80		... .80	
tks, wks 100 lb.	... .65	... .65		... .65	
Silicofluoride, 450 lb bbls NY lb.	.04 .04¼	.04 .04¾		.04¾ .06½	
Stannate, 100 lb drs lb.	.32 .35	.30 .35		.25½ .34	
Stearate, bbls lb.	.19 .24	.19 .24		.19 .24	
Sulfanilate, 400 lb bbls lb.	.16 .18	.16 .18		.16 .18	
Sulfate Anhyd, 550 lb bgs* c-l, wks 100 lb. t	1.45 1.90	1.45 1.90		1.45 1.90	
Sulfide, 80% cryst, 440 lb bbls, wks lb.	... .02¼	... .02¼		... .02¼	
Solid, 650 lb drs, c-l, wks lb.	... .03	... .03		... .03	
Sulfite, cryst, 400 lb bbls, wks lb.	.023 .02½	.023 .02½		.023 .02½	
Sulfocyanide, drs lb.	.28 .47	.28 .47		.28 .47	
Sulforicinoleate, bbls lb.	... .12	... .12		... .12	
Tungstate, tech, crys, kgs lb.	1.05 1.10	1.05 1.10		1.05 1.35	
Sorbitol, com, solut, wks c-l, drs, wks lb.	... .15½	... .15½		.15½ .19	
Spruce Extract, ord, tks lb.	... .01⅛	... .01⅛		... .01⅛	
Ordinary, bbls lb.	... .01⅛	... .01⅛		... .01⅛	
Super spruce ext, tks lb.	... .01⅛	... .01⅛		... .01⅛	
Super spruce ext, bbls lb.	... .01⅞	... .01⅞		... .01⅞	
Super spruce ext, powd, bgs lb.	... .04	... .04		... .04	
Starch, Pearl, 140 lb bgs 100 lb.	2.55 2.85	2.50 2.85		2.40 3.18	
Powd, 140 lb bgs 100 lb.	2.65 2.85	2.60 2.90		2.50 3.28	
Potato, 200 lb bgs lb.	.04 .05	.04 .05		.03½ .05½	
Imp, bgs lb.	.05 .06	.05 .06		.05 .06	
Rice, 200 lb bbls lb.	.06¼ .07¼	.06¼ .07¼		.06¼ .07¼	
Sweet Potato, 240 lb bbls, f.o.b. plant 100 lb.	7.25 7.50	7.25 7.50		... ...	
Wheat, thick, bgs lb.	.05 nom.	.05 .05½		.06¼ .07	
Strontium carbonate, 600 lb bbls, wks lb.	.16½ .17½	.16½ .17½		.16½ .17	
Nitrate, 600 lb bbls, NY lb.	.07¾ .08¼	.07¾ .08¼		.07¾ .09¼	
Sucrose octa-acetate, den, grd, bbls, wks lb.	... .45	... .45		... .45	
tech, bbls, wks lb.	... .40	... .40		... .40	
Sulfur, crude, f.o.b. mines ton	... 16.00	... 16.00		16.00 19.00	
Flour, coml, bgs 100 lb.	1.65 2.35	1.65 2.35		1.65 2.35	
bbls 100 lb.	1.95 2.70	1.95 2.70		1.95 2.70	
Rubbermakers, bgs 100 lb.	2.20 2.80	2.20 2.80		2.20 2.80	
bbls 100 lb.	2.55 3.15	2.55 3.15		2.55 3.15	
Extra fine, bgs 100 lb.	2.85 3.00	2.85 3.00		2.85 3.00	
Superfine, bgs 100 lb.	2.65 2.80	2.65 2.80		2.65 2.80	
bbls 100 lb.	2.25 3.10	2.25 3.10		2.25 3.10	
Flowers, bgs 100 lb.	3.00 3.75	3.00 3.75		3.00 3.75	
bbls 100 lb.	3.35 4.10	3.35 4.10		3.35 4.10	
Roll, bgs 100 lb.	2.35 3.10	2.35 3.10		2.35 3.10	
bbls 100 lb.	2.50 3.25	2.50 3.25		2.50 3.25	
Sulfur Chloride, 700 lb drs, wks lb.	.03 .04	.03 .04		.03 .04	
Sulfur Dioxide, 150 lb cyl lb.	.07 .09	.07 .09		.07 .09	
Multiple units, wks lb.	.04½ .07	.04½ .07		.04½ .07	
tks, wks lb.	.04 .05	.04 .05		.04 .05	
Refrigeration, cyl, wks lb.	.16 .17	.16 .17		.16 .17	
Multiple units, wks lb.	.07½ .10	.07½ .10		.07½ .10	
Sulfuryl Chloride lb.	.15 .40	.15 .40		.15 .40	
Sumac, Italian, grd ton	... 66.00	66.00 67.00		62.00 68.00	
Extract, 42°, bbls lb.	.05¼ .06¼	.05¼ .06¼		.05¼ .06¼	
Superphosphate, 16% bulk, wks ton	... 8.00	... 8.00		8.00 9.00	
Run of pile ton	... 7.50	... 7.50		7.50 8.50	
Triple, 40-48%, a.p.a. bulk, wks, Balt. unit ton	... .70	... .70		.70 .85	
Talc, Crude, 100 lb bgs, NY ton	13.00 15.00	13.00 15.00		13.00 15.00	
Ref'd, 100 lb bgs, NY ton	14.00 16.00	14.00 16.00		14.00 16.00	
French, 220 lb bgs, NY ton	23.00 30.00	23.00 30.00		23.00 30.00	
Ref'd, white, bgs, NY ton	45.00 60.00	45.00 60.00		45.00 60.00	
Italian, 220 lb bgs to arr ton	60.00 62.00	60.00 62.00		60.00 62.00	
Ref'd, white, bgs, NY ton	65.00 70.00	65.00 70.00		65.00 70.00	
Tankage Grd, NY unit u	... 3.00	3.00 3.25		2.50 3.15	
Ungrd unit u	... 3.50	3.00 3.55		2.35 3.00	
Fert grade, f.o.b. Chgo unit u	... 3.25	3.00 3.50		2.25 3.00	
South American cif unit u	... 3.25	3.10 3.35		3.00 3.45	
Tapioca Flour, high grade, bgs lb.	.02½ .04	.01¾ .05½		.02 .05½	
Tar Acid Oil, 15%, drs gal.	.21 .23	.21 .24		.21 .25½	
25%, drs gal.	.25 .27	.25 .28		.25 .29½	

t Bags 15c lower; *u* + 10; * Bbls. are 20c higher.



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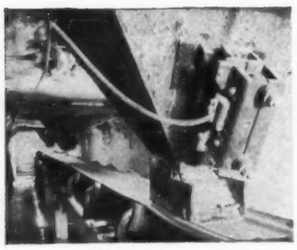
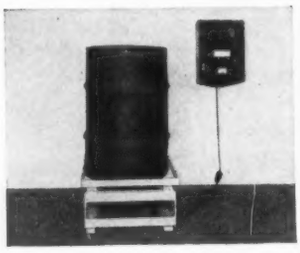
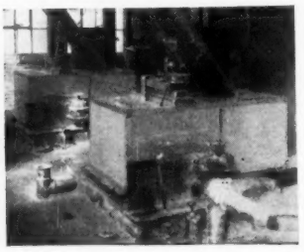


Hopper Vibrators assure free flowing discharge at all times.

Vibratory Feeders provide an easily regulated feed by volume.



Vibrating Packers settle and compact material in containers.



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MANURE SALTS
APPROXIMATELY 30% K_2O

UNITED STATES POTASH COMPANY
INCORPORATED
30 ROCKEFELLER PLAZA, NEW YORK, N. Y.

Tar, Pine
Zinc Carbonate

Prices

	Current Market	1939 Low	1939 High	1938 Low	1938 High
Tar, pine, delv, drs .....gal.	.25	.26	.25	.26	...	.26
tks, delv, E. cities ....gal.	...	.20	...	.20	...	.20
Tartar Emetic, tech, bbls lb.	.27¾	.28	.27¾	.28	.26¾	.28
USP, bbls .....lb.	.33	.33½	.33	.33½	.32	.33½
Terpineol, den grade, drs lb.	...	.17	...	.17	...	.17
Tetrachlorethane, 650 lb drs lb.	.08	.08½	.08	.08½	.08	.08½
Tetrachloroethylene,drs,tech lb.	...	.09½	...	.09½	...	.09½
Tetralene, 50 gal drs, wks lb.	.12	.13	.12	.13	.12	.13
Thiocarbanilid, 170 lb bbls lb.	.20	.25	.20	.25	.20	.25
Tin, crystals, 500 lb bbls,wks lb.	.38	.38½	.35½	.38½	.31	.36½
Metal, NY .....lb.	...	.49	.4520	.49	.3570	.4675
Oxide, 300 lb bbls, wks lb.	.52	.54	.50	.54	.44	.50
Tetrachloride, 100 lb drs, wks .....lb.	...	.24¼	.23	.24¾	.18½	.23½
Titanium Dioxide, 300 lb bbls lb.	.13¼	.16	.13¼	.16	.14½	.17
Barium Pigment, bbls..lb.	.05½	.06½	.05⅝	.06½	.05⅝	.06⅜
Calcium Pigment, bbls..lb.	.05½	.06½	.05⅝	.06½	.05⅝	.06⅜
Toluidine, mixed, 900 lb drs, wks .....lb.	.26	.27	.26	.27	.26	.27
Toluol, 110 gal drs, wks..gal.	...	.27	...	.27	.27	.35
8000 gal tks, frt all'd..gal.	...	.22	...	.22	.22	.30
Toner Lithol, red, bbls...lb.	.62	.67	.62	.80	.75	.80
Para, red, bbls .....lb.	.75	.80	.75	.80	.75	.80
Toluidine, bgs .....lb.	...	1.35	...	1.35	...	1.35
Triacetin, 50 gal drs, wks lb.	...	.36	...	.36	...	.36
Triamyl Borate, lcl, drs, wks lb.	...	.27	...	.27	...	.27
Triamylamine, c-l, drs, wks lb.	.77	1.25	.77	1.25	.77	1.25
Tributylamine, lcl, drs, wks lb.	...	.70	...	.70	...	.70
Tributyl citrate, drs, frt all'd lb.	...	.45	...	.45	...	.45
Tributyl Phosphate, frt all'd lb.	...	.42	...	.42	.42	.50
Trichlorethylene, 600 lb drs, frt all'd E. Rocky Mts..lb.	.08	.08¾	.08	.09½	.089	.09½
Tricresyl phosphate, tech, drs lb.	.23	.37½	.23	.37½	.23	.39
Triethanolamine, 50 gal drs wks .....lb.	.21	.22	.21	.22	.21	.22
tks, wks .....lb.	...	.20	...	.20	...	.20
Triethylene glycol, drs, wks lb.	...	.26	...	.26	...	.26
Trihydroxyethylamine Oleate, bbls .....lb.	...	.30	...	.30	...	.30
Stearate, bbls .....lb.	...	.30	...	.30	...	.30
Trimethyl Phosphate, drs, lcl f.o.b. dest .....lb.	...	.50	...	.50	...	.50
Trimethylamine, c-l, drs, frt all'd E. Mississippi ....lb.	...	1.00	...	1.00	...	1.00
Triphenylguanidine .....lb.	.58	.60	.58	.60	.58	.60
Triphenyl Phosphate, drs..lb.	...	.38	...	.38	.34	.38
Tripoli, airfloated, bgs, wks ton	26.00	30.00	26.00	30.00	26.00	30.00
Turpentine (Spirits), c-l, NY dock, bbls .....gal.	...	.29½**	.29	.35*	.26½	.31½
Savannah, bbls .....gal.	...	.24*	.23½	.29*	.20½	.30¾
Jacksonville, bbls .....gal.	...	.24*	.23½	.26¾	.20½	.30¾
Wood Steam dist, bbls, c-l, NY .....gal.	.27	.30	.242	.30	.242	.31
Wood, dest dist, c-l, drs, delv E. cities .....gal.	.23	.25	.22	.25	.22	.36
U						
Urea, pure, 112 lb cases..lb.	.14½	.15½	.14½	.15½	.14½	.15½
Fert grade, bgs, c.i.f...ton						
c.i.f. S.A. points ....ton	95.00	110.00	95.00	110.00	95.00	110.00
Dom. f.o.b., wks .....ton	95.00	101.00	95.00	101.00	95.00	101.00
Urea Ammonia liq 55% NH_3, tks .....unit	...	nom.	...	nom.	1.00	1.04
V						
Valonia beard, 42%, tannin bgs .....ton	...	45.00	45.00	47.00	45.00	52.00
Cups, 32% tannin, bgs..ton	27.00	29.00	27.00	31.00	30.00	37.50
Extract, powd, 63% ....lb.	...	.06	...	.06	...	.06
Vanillin, ex eugenol, 25 lb tins, 2000 lb lots ....lb.	...	2.60	2.20	2.60	2.10	3.10
Ex-guaiacol .....lb.	...	2.50	2.10	2.50	2.00	3.00
Ex-lignin .....lb.	...	2.50	2.10	2.50	2.00	2.25
Vermilion, English, kgs..lb.	1.62	1.69	1.50	1.70	1.45	1.69
W						
Wattle Bark, bgs .....ton	34.50	38.00	34.50	38.50	36.00	41.75
Extract, 60°, tks, bbls..lb.	...	.04	.04	.04⅜	.04⅜	.04⅝
WAXES						
Wax, Bayberry, bgs .....lb.	.22½	.23	.16⅞	.23	.16⅞	.17
Bees, bleached, white 500 lb slabs, cases .....lb.	.37	.39	.37	.39	.35	.45
Yellow, African, bgs..lb	.19½	.20	.18½	.20	.19	.26
Brazilian, bgs .....lb.	.22½	.23½	.21	.23½	.22	.29
Chilean, bgs .....lb.	.22½	.23½	.21	.23½	.22	.29
Refined, 500 lb slabs, cases lb	.25½	.26	.25½	.33	.32	.39
Candelilla, bgs .....lb.	.15½	.16½	.15¼	.16½	.13½	.16
Carnauba, No. 1, yellow, bgs .....lb.	.41½	.43	.36¾	.43	.38	.44
No. 2, yellow, bgs ...lb.	.41	.41½	.35¾	.41½	.36	.42
No. 2, N. C., bgs ...lb.	.35½	.36	.34	.37	.34	.40
No. 3, Chalky, bgs...lb.	.29½	.31½	.27½	.31½	.29	.35½
No. 3, N. C., bgs ...lb.	.31	.32½	.28¾	.32½	.30	.35½
Ceresin, dom, bgs .....lb.	.08½	.11½	.08½	.11½	.08½	.11½
Japan, 224 lb cases ....lb.	.11¼	.11½	.09¾	.11½	.09¼	.11
Montan, crude, bgs ....lb.	.11	.11¾	.11	.11¾	.11	.12⅛
Paraffin, see Paraffin Wax.						
Spermaceti, blocks, cases lb.	.18	.21	.18	.21	.22	.24
Cakes, cases .....lb.	.19	.22	.19	.22	.23	.25
Whiting, chalk, com 200 lb bgs c-l, wks .....ton	12.00	14.00	12.00	14.00	12.00	14.00
Gilders, bgs, c-l, wks..ton		15.00	...	15.00	...	15.00
Wood Flour, c-l, bgs ...ton	20.00	30.00	20.00	30.00	20.00	33.00
Xylol, frt all'd, East 10° tks, wks .....gal.	...	.29	...	.29	.29	.33
Coml, tks, wks, frt all'd, gal.	...	.26	...	.26	.26	.30
Xylidine, mixed crude, drs lb.	.35	.36	.35	.36	.35	.36
Zinc Acetate, tech, bbls, lcl, delv .....lb.	.15	.16	.15	.21	...	.21
Arsenite, bgs, frt all'd..lb.	.12	.12½	.12	.13	.12½	.13
Carbonate tech, bbls, NY lb.	.14	.15	.14	.15	.14	.15

* June 30. ** June 30.

	Current Market	1939 Low	1939 High	1938 Low	1938 High
Zinc (continued):					
Chloride fused, 600 lb drs, wks ..... lb.	.04¼	.046	.04¼	.046	.04¼	.046
Gran, 500 lb drs, wks lb.	.05	.05¾	.05	.05¾	.05	.05¾
Soln 50%, tks, wks 100 lb.	...	2.25	...	2.25	...	2.25
Cyanide, 100 lb drs.... lb.	...	.33	...	.33	.33	.38
Dust, 500 lb bbls, c-l, delv lb.	...	.06½	.06½	.06¾	.06	.0740
Metal, high grade slabs, c-l, NY ..... 100 lb.	...	4.90	4.84	4.90	4.35	5.45
E. St. Louis ..... 100 lb.	...	4.50	...	4.50	4.00	5.05
Oxide, Amer, bgs, wks. lb.	.06¼	.07½	.06¼	.07½	.06	.07½
French 300 lb bbls, wks lb.	.06½	.07¾	.06½	.07¾	.06¼	.07¾
Palmitate, bbls ..... lb.	.23	.25	.23	.25	.23	.25
Resinate, fused, pale bbls lb.	...	.10	...	.10	...	.10
Stearate, 50 lb bbls .... lb.	.20	.23	.20	.23	.20	.23
Zinc Sulfate, crys, 400 lb bbl, wks ..... lb.	...	.029	...	.029	.029	.033
Flake, bbls ..... lb.	...	.0325	...	.0325	.0325	.0375
Sulfide, 500 lb bbls, delv lb.	.08⅛	.08⅜	.08⅛	.08⅞	.08⅝	.09¾
bgs, delv ..... lb.	.07⅞	.08⅛	.07⅞	.08⅝	.08⅜	.09
Sulfocarbolate, 100 lb kgs lb.	.24	.26	.24	.26	.24	.26
Zirconium Oxide, crude, 73-75% grd, bbls, wks .....ton	75.00	100.00	75.00	100.00	75.00	100.00

Oils and Fats

Babassu, tks, futures ....lb.	...	.06⅜	.06⅛	.06½	.06⅛	.06¾
Castor, No. 3, 400 lb drs lb.	.08¼	.09	.08¼	.10	.09¼	.10¾
Blown, 400 lb drs ....lb.	.10¼	.11	.10¼	.12	.11¼	.13
China Wood, drs, spot NY lb.	...	.21½	.15	.21½	.10¼	.15½
Tks, spot NY .....lb.	.20	nom.	.14½	.20	.095	.15¼
Coconut, edible, drs NY ..lb.	...	.08⅜	.08⅛	.08⅝	.08⅛	.09½
Manila, tks, NY .....lb.	...	.03⅛	...	.03⅛	.03⅛	.03¼
Tks, Pacific Coast...lb.	.02⅞	.03	.02⅝	.03	.02⅝	.03¾
Cod, Newfoundland, 50 gal bbls .....gal.	.32	.33	.29	.35	.35	.52
Copra, bgs, NY .....lb.	...	.0170	.0170	.0180	.0170	.0235
Corn, crude, tks, mills...lb.	.06½	.06⅝	.05⅞	.06⅝	.06⅜	.08¼
Refd, 375 lb bbls, NY. lb.	.08½	.08¾	.08½	.09¾	.09¼	.10½
Degras, American, 50 gal bbls NY .....lb.	.07	.08	.07	.08	.07½	.08¼
English, bbls, NY .....lb.	.07	.08	.07	.08	.07½	.08¼
Greases, Yellow .....lb.	.04⅜	.04⅝	.04⅜	.05⅛	.03½	.05½
White, choice bbls, NY lb.	.05	.05¼	.05	.06	.05	.07
Lard, Oil, edible, prime..lb.	...	.09¾	.09¾	.10¼	.10¼	.12¾
Extra, bbls .....lb	...	.09	.09	.09⅜	.08¾	.10¾
Extra, No. 1, bbls ....lb.	...	.08¾	.08¾	.09¼	.08⅝	.09¾
Linseed, Raw less than 5 bbl lots .....lb	.099	.101	.093	.10	.089	.115
bbls, c-l, spot .....lb.	.091	.093	.085	.093	.081	.102
Tks .....lb.	.085	.087	.079	.087	.07½	.096
Menhaden, tks, Baltimore gal.	.26	nom.	.26	.32	.34½	.37½
Refined, alkali, drs ....lb.	...	.07	.07	.077	.067	.095
Tks .....lb.	...	.064	.064	.071	.061	.087
Kettle bodied, drs ...lb.	...	.082	.082	.088	.076	.105
Light pressed, drs .....lb	...	.064	.064	.071	.061	.091
Tks .....lb	...	.058	.058	.065	.05½	.08
Neatsfoot, CT, 20°, bbls, NY lb.	...	.14¾	.14¾	.15¼	.15¼	.17¼
Extra, bbls, NY .....lb.	...	.09	.09	.09½	.08⅝	.10
Pure, bbls, NY .....lb.	...	.12¼	.10¾	.12¼	.10¾	.12¼
Oiticica, bbls .....lb	.13	.14	.09¼	.14	.09¼	.12¾
Oleo, No. 1, bbls, NY ...lb.	...	.08	.07¾	.08¾	.08½	.10½
No. 2, bbls, NY .....lb.	...	.07½	.07	.08	.08	.10
Olive, denat, bbls, NY ..gal.	.82	.83	.82	.93	.86	1.20
Edible, bbls, NY ....gal.	1.75	2.00	1.75	2.00	1.75	2.35
Foots, bbls, NY .....lb.	.06⅞	.07	.06⅞	.07¼	.07	.09⅞
Palm, Kernel, bulk .....lb.	...	.036	.0340	.036	.0325	.04½
Niger, cks .....lb.	.03¾	.03⅞	.03⅝	.03⅞	...	...
Sumatra, tks .....lb	...	.0270	.0270	.02¾	.02⅝	.0375
Peanut, crude, bbls, NY.lb.	...	.06	.06	.07	.07	.08¼
Tks, f.o.b. mill .....lb	.05⅝	.05¾	.05⅝	.06⅝	.06⅝	.08
Refined, bbls, NY .....lb.	.08¾	.09	.08¾	.10	.09¾	.10¾
Perilla, drs, NY .....lb	...	.10¾	.09½	.10¾	.09¾	.11¾
Tks, Coast .....lb	.102	.103	.089	.103	.09	.11
Pine, see Pine Oil, Chemical Section.						
Rapeseed, blown, bbls, NY lb.	.14	.14½	.14	.14½	.14	.14¾
Denatured, drs, NY ..gal	.80	.82	.80	.82	.75	.91
Red, Distilled, bbls .....lb.	.07¾	.08¾	.07⅜	.08¾	.07⅜	.10⅝
Tks .....lb.	.06½	.07½	.06½	.07½	.06½	.09¾
Sardine, Pac Coast, tks..gal	...	.30	.28½	.34	.28	.46½
Refined alkali, drs .....lb.	...	.07	.07	.077	.067	.095
Tks .....lb	...	.064	.064	.071	.061	.087
Light pressed, drs .....lb.	...	.064	.064	.071	.061	.089
Tks .....lb.	...	.058	.058	.065	.05½	.08
Sesame, yellow, dom ....lb.	.09⅛	.09¼	.09	.10½	.10¼	.10½
White, dom .....lb.	.09⅛	.09¼	.09	.10½	.10¼	.10½
Soy Bean, crude Dom, tks, f.o.b. mills .lb	...	.05⅛	.05⅛	.05¾	.05⅞	.07
Crude, drs, NY .....lb	.05¾	.06	.05¾	.065	.06½	.08
Ref'd, drs, NY .....lb.	.07	.07½	.07	.077	.07⅝	.097
Tks .....lb.	...	.063⅜	.063⅜	.0675	.0685	.082
Sperm, 38° CT, bleached bbls NY .....lb.	.09	.092	.09	.10	.10	.102
45° CT, bleached, bbls, NY .....lb.	.083	.085	.083	.093	.093	.095
Stearic Acid, double pressed dist bgs .....lb.	.10½	.11½	.10½	.11½	.10	.12
Double pressed saponified bgs .....lb.	.10¾	.11¾	.10¼	.11¾	.10¼	.12¼
Triple pressed dist bgs .lb.	.13½	.14½	.13	.14½	.13	.15
Stearine, Oleo, bbls .....lb.	.05¾	.06	.05¾	.06¾	.05½	.08½
Tallow City, extra loose..lb.	...	.05⅜	.05⅛	.05⅜	.04¾	.06⅛
Edible, tierces .....lb.	.05½	nom.	.05½	.06	.05	.07⅜
Acidless, tks, NY .....lb	...	.08	.08	.08¼	.07¾	.09¼
Turkey Red, single, drs...lb.	.06	.07	.06	.08⅝	.06¼	.08½
Double, bbls .....lb	.08¾	.09¾	.08¾	.10⅞	.09½	.13
Whale: Winter bleach, bbls, NY lb.	.081	.083	.081	.083	.081	.10
Refined, nat, bbls, NY..lb	.077	.079	.077	.079	.077	.096

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"We"—Editorially Speaking

Dr. D. P. Morgan, author of "Chemical Financing," page 27 in this issue, (one of the Creating Industries Series, 1919-1939) was born at Lenox, Mass., on Sept. 4, 1894. His preparatory work was done at

Middlesex School, Concord, Mass. He then entered Harvard where he specialized in economics and chemistry, receiving his A.B. in '16. He was captain of the varsity crew and rowed at Henley in '14. "Tick" as he is known to his intimates, entered the service during the World War as a seaman, second class, and was discharged with the rank of lieutenant, senior grade in the U. S. Naval Reserve Flying Corps in '19.

The following month Dr. Morgan entered Columbia to do graduate work and received his Ph.D in '23. In 1923-'24 he was a fellow of the National Research Council. The following year he became associated with Loomis, Stump & Banks, consulting chemical engineers. In '29 he joined the staff of Scudder, Stevens & Clark, acting as consultant in matters relating to the chemical industry. Dr. Morgan is married and has one daughter. He has been very prominent in affairs of the A.C.S., The American Institute of Chemists, the Society of Chemical Industry, and the Chemists' Club (N. Y.). He is a widely known author on economic and chemical subjects and when "We" asked our Consulting Board of Directors to suggest the man best qualified to contribute the chapter on chemical financing in the "Creating Industries Series" the unanimous vote of the group went to "Tick."

❖❖❖❖

The month's news highlight is not that "Joe" Harold (author of "Chemicals in the Textile Industry," page 25) had an arm broken recently—but when it happens because a pretty young nurse in the hospital gets so flustered that she tries to bend his arm in a direction that nature never intended an arm should be bent—then "We" do think that this is news of the "Man Bites Dog" variety.

❖❖❖❖

One of the finest tributes to an article in CHEMICAL INDUSTRIES comes directly from our own printer who tells us that all of the available copies of "C. I." for April have been taken by the men in the plant desirous of having a personal copy of Dr. Albert E. Gessler's article on "Printing Inks."

❖❖❖❖

Somewhat disconcerting to say the least was the "Fried Rhode Island Reds" on the dinner menu of the Rumford Chemical party until "We" read on that "fried chicken is as American as the Star Spangled Banner?"

❖❖❖❖

"We" would like to have had the "bicarb" concession after that Rumford dinner party.

❖❖❖❖

Somewhat in the nature of a "scoop" is the publication in this issue of Robert H. Leach's article "Silver as a Raw Material." "We" prefer to attribute the timeliness to sheer good luck, however, rather than any inside information from Washington.

"We" don't claim that Handy & Harman's vice-president will explain the innermost workings of the current Washington gyrations on dollar control and the silver "tie-in," but certainly careful reading of his splendid article will provide a background of facts and figures that will prove most helpful.

❖❖❖❖

According to Dr. Jerome Alexander golf is a game where the ball may lie badly but the player never does.

❖❖❖❖

Don't bother to ask us who the young lady is that posed for the photograph on page 25—"We" honestly don't know.

❖❖❖❖

"We" journeyed up to the Stamford "labs" of Cyanamid recently to confer with Coleman Caryl about his article "Dicyandiamide" (page 48) and came away with a challenge to race his "16-footer." Discreet inquiries seem to indicate that he is no "rocking-chair" member of Riverside Yacht Club and secretly "We" would like to call the whole thing off.

❖❖❖❖

John Van Deventer, editor of "Iron Age" has rendered yeoman service to his industry many years, giving them real intellectual leadership and teaching sound economics with zeal and in an exceptionally clear and often brilliant style. That the machine, far from creating unemployment has made for greater wealth, shorter hours, and higher wages, is one of his favorite texts; and "We" can guess with what joy he discovered and reprinted the following:

"By a survaie of the towne of Sheffild, made the second daie of Januarie 1615, by twenty-four of the most sufficient inhabitants there, it appeareth that there are in the towne of Sheffild 2207 people; of which there are 725 which are not able to live without the charity of their neighbours; these are all begging poore. One hundred housholders which relieve others. These (though the best sorte) are but poor artificers; among them there is not one that can keep a teame on his own land, and not above tenn that have ground of their own that can keep a cow. One hundred and sixty householders not able to relieve others. These are such (although they beg not) as are not able to abide the storme of one fortnight's sickness, but would be thereby driven to beggary. One thousand two hundred and twenty-two children and servants of the said householders, the greatest part of which are such as live of small wages, and are constrained to work sore to provide them necessaries."

Our thanks to Consulting Editor Dorr for having brought this choice quotation of a day nearly two centuries before the dawn of our maligned Industrial Age to our attention. We share our confrére's pleasure in broadcasting it to our readers in this "ultra-modern industry."

Fifteen Years Ago

From our files of July, 1924

Control of Devoe & Raynolds, one of the country's oldest paint manufacturers, passes to 16 employees who bought control from the old owners.

Col. H. A. Metz, H. A. Metz & Co., N. Y. City, addresses the Northern New England Section, A. A. T. C. C., July 10 at Merrimack Valley Country Club, Methuen, Mass.

Dr. Leo H. Baekeland, president of the A. C. S., is made a Commander of the Order of Leopold by Albert, King of Belgium.

Spencer Kellogg & Sons, Buffalo, N. Y., celebrate the 100th anniversary of the establishment of the firm.

State of Chemical Trade

Current Statistics (June 30, 1939)—p. 37

WEEKLY STATISTICS OF BUSINESS

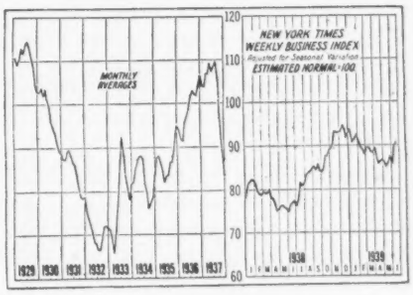
Week Ending	Carloadings 1939	Carloadings 1938	Carloadings % of Change	Electrical Output* 1939	Electrical Output* 1938	Electrical Output* % of Change	Jour. of Com. Price Index	Nat'l Chem. & Drugs	Fertilizer Fats & Oils	Ass'n Fert. Mat.	Price Indices Mixed Fert.	Price Indices All Groups	†Labor Dept. Chem. & Drug Price Index	†Labor Dept. % Steel Activity	N. Y. Times Index Bus. Act.	Fisher Commodity Index
May 27	627,674	562,076	+11.5	2,204,858	1,973,278	+11.7	75.5	91.9	49.8	71.3	77.2	72.3	75.7	52.2	87.6	125.4
June 3	567,732	502,617	+13.0	2,113,887	1,878,851	+12.5	75.2	91.9	49.4	71.3	77.2	72.0	75.8	54.2	86.0	126.2
June 10	634,597	553,854	+14.6	2,256,823	1,991,787	+13.3	74.8	91.9	49.3	71.3	77.2	71.6	75.6	53.1	89.8	126.2
June 17	637,873	555,519	+14.8	2,264,719	1,991,115	+13.7	74.7	91.9	49.0	71.2	77.3	71.6	75.5	55.0	90.6	126.7
June 24	642,987	558,788	+15.1	2,285,083	2,019,036	+13.2	74.6	91.9	48.0	70.4	77.3	71.7	75.0	54.3	91.3	126.7

*K.W.H., 000 omitted †1926-1928 = 100.0.

MONTHLY STATISTICS

	May 1939	May 1938	April 1939	April 1938	March 1939	March 1938
CHEMICAL:						
Acid, sulfuric (expressed as 50° Baumé, short tons, Bureau of the Census)						
Total prod. by fert. mfrs.	.....	.....	145,689	143,469	169,952	154,379
Consumpt. in mfr. fert.	.....	.....	112,593	110,496	119,081	129,233
Stocks end of month	.....	.....	90,458	93,494	94,529	93,319
Alcohol, Industrial (Bureau Internal Revenue)						
Ethyl alcohol prod., proof gal.	18,655,264	14,252,840	17,858,504	12,816,786	17,422,863	18,305,610
Comp. denat. prod., wine gal.	695,326	903,603	240,918	297,743	504,866	130,577
Removed, wine gal.	597,648	803,863	184,319	300,348	480,383	121,517
Stocks end of mo., wine gal.	608,807	645,192	518,723	546,055	456,115	549,026
Spec. denat. prod., wine gal.	7,795,113	5,188,803	7,477,590	5,988,829	7,110,717	6,076,362
Removed, wine gal.	7,605,163	5,268,570	7,338,848	6,063,358	7,097,752	6,048,474
Stocks end of mo., wine gal.	1,157,127	495,937	973,027	581,247	847,794	663,519
Ammonia sulfate prod., tons *a*	33,064.5	32,002	39,634.5	34,342	46,669	36,134
Benzol prod., gal. *b*	5,546,000	4,905,000	6,813,000	5,385,000	8,063,000	5,998,000
Byproduct coke, prod., tons *a*	2,396,435	2,282,621	2,914,660	2,436,264	3,438,537	2,675,071
Cellulose Plastic Products (Bureau of the Census)						
Nitrocellulose sheets, prod., lbs.	755,527	415,981	802,067	453,596	917,274	481,134
Sheets, ship., lbs.	626,647	503,539	663,460	525,132	818,229	607,496
Rods, prod., lbs.	221,139	212,167	255,918	199,119	311,893	214,784
Rods, ship., lbs.	259,152	192,875	238,098	201,392	290,064	263,186
Tubes, prod., lbs.	59,539	40,096	58,420	37,989	85,841	57,994
Tubes, ship., lbs.	54,017	58,610	48,521	51,179	62,749	73,396
Cellulose acetate, sheets, rod, tubes						
Production, lbs.	490,684	257,722	508,264	249,185	1,077,560	168,073
Shipments, lbs.	508,786	253,491	522,346	259,209	1,029,302	202,715
Molding comp., ship.; lbs.	704,085	434,598	599,609	433,487	809,718	446,689
Methanol (Bureau of the Census)						
Production, crude, gals.	.....	.....	389,423	314,664	364,500	432,800
Production, synthetic, gals.	.....	.....	2,276,385	1,975,999	2,406,564	2,343,828
Pyroxylin-Coated Textiles (Bureau of the Census)						
Light goods, ship., linear yds.	2,652,199	2,559,071	2,642,840	2,598,653	3,108,289	2,829,145
Heavy goods, ship., linear yds.	2,106,754	1,527,494	1,933,597	1,657,602	2,396,423	1,858,869
Pyroxylin spreads, lbs. *c*	4,726,511	4,128,819	4,642,742	4,318,463	5,401,941	4,831,049
Exports (Bureau of Foreign & Dom. Commerce)						
Chemicals and related prod. *d*	.....	.....	.....	$11,459	.....	$11,560
Crude sulfur *d*	.....	.....	$933	$1,130	$756	$717
Coal-tar chemicals *d*	.....	.....	$990	$1,025	$961	$1,047
Industrial chemicals *d*	.....	.....	$2,355	$2,269	$2,261	$2,136
Imports						
Chemicals and related prod. *d*	.....	.....	.....	$6,728	.....	$7,804
Coal-tar chemicals *d*	.....	.....	$4,129	$1,256	$1,122	$960
Industrial chemicals *d*	.....	.....	$2,202	$1,159	$1,459	$1,766
Payrolls (U. S. Dept. of Labor, 3 year av., 1923-25 = 100)						
Chemicals and allied prod., including petroleum	120.7	115.7	120.5	114.3	121.6	117.3
Other than petroleum	117.1	108.3	118.0	108.0	118.6	111.3
Chemicals	128.9	116.8	127.9	117.4	130.9	118.5
Explosives	91.8	83.2	89.5	83.8	91.5	88.1
Employment (U. S. Dept. of Labor, 3 year av., 1923-25 = 100)						
Chemicals and allied prod., including petroleum	111.6	108.8	114.9	112.4	114.4	115.1
Other than petroleum	110.2	105.9	114.6	110.2	114.0	113.6
Chemicals	114.5	109.6	114.9	111.4	116.5	113.4
Explosives	82.0	80.3	80.8	81.4	81.3	82.5
Price index chemicals	79.4	81.2	79.3	81.9	79.9	83.2
Chem. and drugs	75.9	76.8	76.0	77.5	76.5	78.7
Fert. mat.	69.7	69.6	69.6	70.1	69.7	71.8
FERTILIZER:						
Exports (long tons, Nat. Fert. Association)						
Fertilizer and fert. materials	.....	.....	136,328	158,717	123,687	172,296
Ammonium sulfate	.....	.....	208	118	1,199	686
Total phosphate rock	.....	.....	111,181	132,573	90,738	131,830
Total potash fertilizers	.....	.....	5,710	11,073	17,102	7,031
Imports (long tons, Nat. Fert. Association)						
Fertilizer and fert. materials	.....	.....	189,213	159,614	142,430	189,265
Ammonium sulfate	.....	.....	10,685	10,493	14,179	10,204
Sodium nitrate	.....	.....	115,188	96,688	42,920	91,426
Total potash fertilizer	.....	.....	16,580	6,561	17,235	22,322

INDUSTRIAL TRENDS



Business: The last 2 weeks of June were marked by a more confident tone than prevailed during the first half of the month. N. Y. Times Index of Activity moved upward, from 86.0 on June 3rd, to 90.6 on the 24th of the month. The curve may be expected to rise even further in the next 10 days or so, unless new and loud rumors of war overseas discourage the upward tendency. "Repeal" of the undistributed profits tax was, perhaps, a contributor to the brighter outlook during the last days of June.

Steel: The July 4 plant holiday, together with diminishing requirements of the automotive trades, have probably been responsible for restricted operations in the last few weeks. Present rate of activity is likely to be several points lower than the 53.5% estimated for the June 17 week. Summer schedules, however, are to be heavier than usual, if new auto models have an early start this year.

Automotive: May output, reported at 297,508 units, was about 12% under the April figure, but was a healthy advance from the 195,000 units of May, 1938. Slower schedules may be maintained through July, with a pick-up to be expected for August when production on the new models gets under way.

Retail Trade: Sales have shown a definite improvement in the face of a tendency to follow the usual seasonal slump. According to the Federal Reserve Board, department store sales for the 4 weeks ending June 24 were 7% larger than for the corresponding period of '38. In May, the increase over the like '38 month was about 8%. Summer sportswear and related goods have been very popular. N. Y. City reports that the World's Fair has definitely boosted trade in the metropolitan area.

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Wholesale Trade: Somewhat better demand for loom products has steadied the wholesale field. For the balance of the summer, it is likely that buying will continue at encouraging levels.

Textiles: Most cotton and rayon weaves enjoyed a heavy demand during the month past, and the mills anticipate a very active summer. Rayon production holds up well. Woolens remain quiet and firm.

Glass: Construction gains would indicate a fairly encouraging season ahead. Containers especially are in a good position this year, being produced in about 10% greater volume than in the first half of last year.

Rubber: Tire production and shipments in May were well ahead of last year at that time; output for May was 4,418,072 casings, about 16% ahead of that recorded for the same month last year; deliveries in May, totaling 4,753,403, were nearly 15% greater than in the like '38 month. Replacement sales are expected to continue at a high rate for the balance of the summer.

Commodity Prices: Some weakness has characterized industrial indices in late June, the Dow-Jones Index on the 20th being 49.29, on the 26th 49.39, and on the 27th rising abruptly to 49.77. On the last day of the month, this index fell to 49.64. Prospective improvements are sure to stabilize them, possibly at a slightly lower level than was looked for earlier in the month.

Coatings: June paint sales were reported nearly equal to May. A greater retail volume is looked for in July, with improved weather conditions helping it along.

Carloadings: Carloadings set a new high for the year, 642,987 being reported in the June 24th week. The 6-month total (up to June 24) of 14,678,066 cars is about 8% better than that in '38, but is nearly 20% under the corresponding '37 figure.

Construction: Engineering awards have averaged about 20% over last year, according to last-minute estimates for the 6-month period just ended.

Electric Energy: Power output in the week of June 24 was 2,285,083,000 Kwh., 13.2% greater than in the corresponding week of last year, topping the energy production of any single 1939 week to date.

Outlook: International complications aside, prospects for the next 6 months are encouraging. Although Congress has acceded to a few demands for more rational taxation, there remains much that it could do to restore confidence in a substantial degree.

MONTHLY STATISTICS (cont'd)

	May 1939	May 1938	April 1939	April 1938	March 1939	March 1938
FERTILIZER: (Cont'd)						
Superphosphate e (Nat. Fert. Association)						
Production, bulk	223,439	227,223	220,690	220,166	245,007	257,595
Shipments, total	532,795	410,067	807,405	756,121	607,094	664,739
Northern area	372,593	262,122	344,146	350,467	184,525	235,742
Southern area	160,202	147,945	463,259	405,654	422,569	428,997
Stocks, end of month, total	825,238	1,034,204	1,079,891	1,179,223	1,615,376	1,670,877
Tag Sales (short tons, Nat. Fert. Association)						
Total, 17 states	390,982	331,568	1,315,134	167,985	1,581,205	1,587,602
Total, 12 southern	312,313	275,761	1,271,077	1,039,745	1,478,041	1,515,334
Total, 5 midwest	78,669	55,807	44,057	68,240	103,164	72,268
Fertilizer payrolls	108.3	93.9	137.3	118.8	105.6	109.2
Fertilizer employment	113.3	100.1	160.2	136.3	132.2	129.5
Value imports, fert. and mat. *d*	.....	$2,880	$4,370	$1,520	$3,291	$4,261
GENERAL:						
Acceptances outst'd'g *f*	$246	$268	$237	$278	$245	$292
Coal prod., anthracite, tons	.....	3,821,416	5,227,000	3,138,000	3,604,000	3,467,048
Coal prod., bituminous, tons	.....	21,266,000	10,747,000	21,671,000	35,290,000	26,745,000
Com. paper outst'd'g *f*	$188	$251	$191	$271	$191	$296
Failures, Dun & Bradstreet	1,122	1,123	1,140	1,172	1,123	1,167
Factory payrolls *i*	84.4	72.9	84.9	74.6	86.8	73.3
Factory employment *i*	90.1	83.4	91.2	85.7	91.3	81.7
Merchandise imports *i*	$202,502	$148,248	$186,195	$159,827	$190,416	$173,372
Merchandise exports *i*	$249,259	$257,276	$230,947	$274,472	$268,364	$275,308
GENERAL MANUFACTURING:						
Automotive production	297,508	192,059	337,372	219,310	371,940	221,795
Boot and shoe prod., pairs	32,109,950	30,472,552	32,577,945	33,467,918	42,375,490	37,542,928
Bldg. contracts, Dodge *j*	$308,487	$223,156	$330,030	$222,016	$300,661	$226,918
Newsprint prod., U. S. tons	85,872	68,001	77,393	58,836	79,929	67,864
Newsprint prod., Canada, tons.	250,015	207,678	220,843	200,794	220,648	224,604
Glass Containers, gross *d*	4,516	.....	4,071	3,647	4,128	3,637
Plate glass prod., sq. ft.	8,035,832	3,866,052	7,268,068	3,819,735	11,866,817	3,802,111
Window glass prod., boxes	728,653	360,256	738,951	341,014	912,301	528,032
Steel ingot prod., tons	2,917	1,800	2,986,985	1,919,042	3,396,021	2,004,204
% steel capacity	48.30	29.75	51.25	33.44	55.63	33.85
Pig iron prod., tons	1,717,516	1,255,024	2,033,259	1,376,141	2,394,615	1,452,487
U. S. consumpt. crude rub., tons	44,137	30,753	44,166	27,984	50,165	30,487
Tire shipments	4,753,403	3,273,000	4,356,000	3,143,000	4,582,655	2,794,956
Tire production	4,418,072	2,987,000	4,211,000	2,660,000	5,137,030	2,679,735
Tire inventories	9,918,759	11,597,000	9,998,000	10,141,000	10,108,584	10,520,813
Cotton consumpt., bales	605,363	426,149	546,702	414,392	649,237	512,626
Cotton spindles oper.	21,975,222	21,341,846	22,109,394	21,786,054	22,472,330	22,288,098
Silk deliveries, bales	.....	28,687	21,802	33,381	37,863	34,884
Wool Consumption *z*	29.8	16.6	27.7	15.9	30.9	16.7
Rayon deliv., lbs.	25,900,000	16,200,000	23,100,000	16,300,000	26,500,000	18,300,000
Hosiery (all kinds) *t*	.....	.....	10,577,136	10,593,254	10,433,355	8,000,059
Rayon employment *i*	308.1	283.8	315.4	283.0	317.3	312.1
Rayon payrolls *i*	298.3	257.9	304.4	244.2	313.9	281.7
Soap employment *i*	87.7	85.0	88.4	86.9	90.5	89.0
Soap payrolls *i*	90.3	86.0	91.2	87.0	92.5	89.7
Paper and pulp employment *i*	106.7	102.9	106.3	104.3	106.1	105.4
Paper and pulp payrolls *i*	105.5	97.2	104.6	98.4	105.5	101.8
Leather employment	86.6	86.0	94.0	92.1	97.6	94.2
Leather payrolls *i*	63.8	60.9	74.5	70.6	83.2	76.6
Glass employment *i*	91.6	80.7	91.9	81.6	90.6	83.5
Glass payrolls *i*	91.8	79.1	89.4	77.6	95.3	81.4
Rubber prod. employment *i*	81.2	71.4	82.1	72.7	82.8	72.9
Rubber prod. payrolls *i*	82.1	63.3	83.0	61.9	85.4	60.9
Dyeing and fin. employment *i*	112.8	101.9	114.4	103.6	116.0	105.2
Dyeing and fin. payrolls *i*	94.5	83.2	97.0	86.1	101.0	89.1
MISCELLANEOUS:						
Oils & Fats Index ('26 = 100)	54.5	60.6	53.8	61.6	55.3	65.2
Gasoline prod., bbls.	.....	.....	47,402	44,672	47,318	44,139
Cottonseed oil consumpt., bbls.	.....	.....	.....	.....	307,053	361,218
PAINT, VARNISH, LACQUER, FILLERS:						
Sales 680 establishments	$41,853,977	$36,827,421	$33,999,205	$34,731,597	$32,888,357	$30,728,890
Trade sales (580 establishments)	$25,436,932	$22,900,709	$18,862,040	$20,861,998	$17,656,995	$17,227,950
Industrial sales, total	$12,578,360	$10,135,607	$11,843,829	$10,392,797	$12,112,220	$10,417,161
Paint & Varnish, employ. *i*	118.4	114.9	117.6	114.2	114.9	113.5
Paint & Varnish, payrolls *i*	127.2	119.5	123.2	114.1	120.4	110.8
Paint & Varnish, exports *d*	.....	.....	.....	.....	$599	$770

a Bureau of Mines; *b* Crude and refined plus motor benzol, Bureau of Mines; *c* Based on 1 lb. of gun cotton to 7 lbs. of solvent, making an 8-lb. jelly; *d* 000 omitted, Bureau of Foreign & Domestic Commerce; *e* Expressed in equivalent tons of 16% A.P.A.; *f* 000,000 omitted at end of month; *i* U. S. Dept. of Labor, 3 year average, 1923-25 = 100; *j* 000 omitted, 37 states; *p* Rayon Organon, formerly an index was given, now the exact poundage is given; *q* 680 establishments, Bureau of the Census; *r* Classified sales, 580 establishments, Bureau of the Census; *s* 53 manufacturers, Bureau of the Census; *t* 381 identical manufacturers, Bureau of the Census, quantity expressed in dozen pairs; *v* In thousands of bbls., Bureau of the Census; ** Indices, Survey of Current Business, U. S. Dept. of Commerce; *z* Units are millions of lbs.

I. G. Farbenindustrie Nets Rm. 55,180,000 in 1938

Sharing the common fate of Germany's major industrial firms, I. G. shareholders participated last year to a relatively small extent in the rising profits of the mammoth German chemical combine. Although '38 profits were rm. 55,180,000, taxes took about 2¼ times as much (rm. 125,050,000) from company's treasury. In 1937, net profits of rm. 54,850,000 compared more equitably with the 79,200,000 set aside for the Reich.

I. G. is strongly entrenched, financially, with investments of rm. 230,000,000 reported for last year. In 1937, this figure was about 33% less, rm. 156,400,000. These figures are not an accurate picture of the financial structure, for the latter is not indicative of the part played by the numerous subsidiaries (so-called G. m. b. H's, or private companies) whose balance sheets are not liable to publication under existing company laws.

Thus, most of the I. G. synthetic nitrogen and gasoline interests with the Leuna Works are concentrated in the Ammoniakwerk Merseburg G. m. b. H., capitalized at rm. 135,000,000. Synthetic rubber ("buna") manufacture is carried on by 2 special companies with an aggregate capitalization of rm. 80,000,000. Rearmament programs are undoubtedly intended to be concealed, if only partially so, by this bookkeeping system.

I. G.'s report is optimistic about the export business. Both Central and South America, and southeastern Europe have absorbed a substantial and increasing volume of I. G. exports. It is said that I. G. accounts for about two-thirds of Germany's chemical exports.

Has Best Half-Year

The first 6 months of this year were the best in the history of Abbott Labs., stockholders were advised by president S. DeWitt Clough in a letter accompanying the regular quarterly dividend ($1.12½).

Company's profits in the first 5 months were larger than in any similar period on record and June promises to bring the earnings for the first half above those for any initial 6-month period in the company's history. Best previous first half was in 1937 when company earned $865,335.

A.A.C. Shows 9-Month Loss

Report of American Agricultural Chemical Co. of Delaware and subsidiaries for 9 months ended March 31, 1939, shows net loss of $152,955 after taxes, depreciation, depletion, reserve for self-insurance, etc. This compares with net profit of $427,390, equivalent to $2.04 a share on 209,431 no-par shares of capital stock for the 9 months ended March 31, 1938.

For the 6 months ended Dec. 31, 1938, company reported net loss of $285,903 after taxes and charges.

Stocks Decline In June

Total market value of shares listed on the N. Y. Stock Exchange declined $2,224,592,081 last month, according to a compilation issued by the Exchange. Average price a share of all listed stocks on June 30 was $28.70 compared with $30.29 at the end of May.

On June 30 there were 1,234 issues listed, aggregating 1,428,586,085 shares, with a total market value of $41,004,995,092. This compared with 1,233 issues listed on May 31, aggregating 1,426,995,729 shares and having a total market value of $43,229,587,173.

The Board of Directors, Hercules Powder Co., declared a regular quarterly dividend of 1½% on its preferred stock, payable Aug. 15 to stockholders of record on Aug. 4.

Price Trend of Representative Chemical Company Stocks

	May 31	June 3	June 10	June 17	June 24	June 30	Net gain or loss last mo.	Price on June 30, 1938	1939 High	1939 Low
Air Reduction	53¼	53	54	50⅜	51½	46¾	— 6½	60¾	65⅝	45¼
Allied Chemical	167	166	165½	163	165	160	— 7	172	193	151½
Amer. Cyanamid "B"	23½	23¼	25⅝	24½	25	23½	.....	23	28⅜	18⅜
Amer. Agric. Chem.	18⅜	18⅛	20¼	18½	17½	18	— ⅜	62½	24¼	16
Columbian Carbon	88	87⅞	89¾	84	90½	87½	— ½	83	93	73
Commercial Solvents	11¼	11¼	11⅛	10⅛	10⅛	9¼	— 2	8	13¾	9⅛
Dow Chemical	114½	113	119	116½	119	116	+ 2½	125½	135	101½
Du Pont	147	146¾	149¾	146¾	149¾	147	.....	119¾	156¾	126¼
Hercules Powder	70½	69½	73½	69⅝	72	67	— 3½	54½	86	63
Mathieson Alkali	26¼	25¾	26¼	24	25	23⅞	— 2⅜	21½	36	23
Monsanto Chemical	97	97½	98½	97	99	95	— 2	89½	111	85¾
Std. of N. J.	44½	43¼	45¼	42½	42⅝	40¾	— 3¼	52⅞	53¼	40⅛
Texas Gulf Sulphur	29	28½	28¼	28⅞	28⅜	26⅝	— 2⅜	34	32⅝	26¼
Union Carbide	76¼	77	81½	78⅛	78⅞	71¾	— 4½	77¼	90½	65½
U. S. Ind. Alcohol	17½	16¼	16½	16	15¾	14⅜	— 3⅛	22¼	25¾	13½

Earnings Statements Summarized

Company:	Annual dividends	Net income 1939	Net income 1938	Common share earnings 1939	Common share earnings 1938	Surplus after dividends 1939	Surplus after dividends 1938
American I. G. Chemical Corp.:							
Year, March 31	ya$4.00	$3,223,792	$4,186,110	a$4.03	a$5.26	.....	.....
Celotex Corp.:							
April 30 quarter	f...	22,536	109,128	p.77	.27	.....	.....
Six months, April 30	f...	10,400	117,531	p.35	.16	.....	.....
Month of May	f...	159,800	69,691	...	...	.....	.....
Certain-teed Products Corp.:							
Month of May	f...	61,000	18,129	...	...	.....	.....
Masonite Corp.:							
Twelve weeks, June 3	1.00	258,380	246,685	h.44	h.42	.....	.....
Forty weeks, June 3	1.00	701,303	798,623	h1.17	h1.35	.....	.....
Valspar Corp.:							
Twelve months, May 31	f...	110,616	107,604	...	...	.....	.....

a On Class A shares; *f* No common dividend; *h* On shares outstanding at close of respective periods; *p* On preferred stock; *y* Amount paid or payable in 12 months to and including the payable date of the most recent dividend announcement.

Dividends and Dates

Name	Div.	Stock Record	Payable
Abbott Labs., E	10c	June 13	June 30
Abbott Labs., q.	40c	June 13	June 30
Abbott Labs, pf., q.	$1.12½	July 1	July 15
Air Reduction, q.	25c	June 30	July 15
Amer. Agric. Chem.	35c	June 15	June 30
Amer. Cyanamid, A & B, q.	15c	June 15	July 1
Amer Cyanamid, pf., q.	12½c	June 15	July 1
Amer. Maize-Products	25c	June 22	June 30
Amer. Potash & Chemical	$2.00	June 22	June 29
Bon Ami, A, q.	$1.00	July 15	July 31
Bon Ami, B, q.	62½c	July 15	July 31
Colgate-Palmolive-Peet, pf., q.	$1.50	June 6	July 1
Devoe & Raynolds, 2nd pf., q.	$1.75	June 20	July 1
Diamond Match	50c	Aug. 10	Sept. 1
Diamond Match	25c	Nov. 10	Dec. 1
Diamond Match, pf., s.	75c	Aug. 10	Sept. 1
Du Pont, pf., q.	$1.12½	July 10	July 25
Du Pont, deb. q.	$1.50	July 10	July 25
Eastman Kodak, q.	$1.50	June 5	July 1
Eastman Kodak, pf., q.	$1.50	June 5	July 1
Eagle-Picher Lead, pf., q.	$1.50	June 15	July 1
Glidden Co., pf., q.	56¼c	June 16	July 1
Hercules Powder, pf., q.	(1½%)	Aug. 4	Aug. 15
International Nickel of Canada	50c	May 31	June 30
International Nickel of Canada, pf., q.	$1.75	July 3	Aug. 1
International Salt, q.	37½c	June 15	July 1
Koppers, 6% pf.	75c	June 15	July 1
Liquid Carbonic	20c	June 15	July 1
Masonite Corp., q.	25c	Aug. 19	Sept. 10
Masonite Corp., pf., q.	$1.25	Aug. 19	Sept. 1
Mathieson Alkali, q.	37½	June 8	June 30
Mathieson Alkali, pf. q.	$1.75	June 8	June 30
Merck & Co.	25c	June 19	July 1
Merck & Co., pf. q.	$1.50	June 19	July 1
Monsanto Chemical, pf., A, s.	$2.25	Nov. 10	Dec. 1
Monsanto Chemical, pf., B, s.	$2.25	Nov. 10	Dec. 1
National Lead	12½c	June 16	June 30
National Lead, Cl. B, pf., q.	$1.50	July 21	Aug. 1
National Oil Products, i	25c	June 20	June 30
Pittsburgh Plate Glass	75c	June 10	July 1
Procter & Gamble, 8% pf., q.	$2.00	June 23	July 15
Pure Oil Co., 5% pf., q.	$1.25	June 9	July 1
Pure Oil Co., 5¼% pf.	$1.25	June 9	July 1
Pure Oil Co., 6% pf., q.	$1.50	June 9	July 1
Quaker Oats, q.	$1.25	June 1	June 24
Quaker Oats, pf., q.	$1.50	Aug. 1	Aug. 31
St. Joseph Lead	25c	Sept. 8	Sept. 20
Skelly Oil, 6% cum. pf., q.	$1.50	July 5	Aug. 1
Southern Phosphate	15c	June 16	June 30
Staley (A.E.) Mfg. Co., 7% pf., s.	$3.50	June 20	July 1
Union Carbide	50c	June 2	July 1
United Carbon, q.	75c	June 15	July 1
United Dyewood, pfd., q.	$1.75	June 9	July 1
Victor Chemical Works, q.	25c	June 20	June 30

(E) extra; (i) interim; (s)) semi-annual.

Chemical Finances
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Chemical Stocks and Bonds

PRICE RANGE June 1939 Last	1939 High	1939 Low	1938 High	1938 Low	1937 High	1937 Low	Sales (Number of shares June 1939)	Sales 1939	Stocks	Par $	Shares Listed	Dividends*	Earnings** $-per-share-$ 1938	1937	1936
NEW YORK STOCK EXCHANGE															
58¼	64¾	53	61	46¼	55	46	4,300	18,400	Abbott Labs.	No	640,000	$1.70	2.43	2.51	2.21
48¾	65⅝	45¼	67⅞	40	80¼	44½	14,100	104,800	Air Reduction	No	2,563,992	1.50	1.47	2.86	2.79
160	193	151½	197	124	258½	145	8,200	57,200	Allied Chem & Dye	No	2,214,099	6.00	5.92	11.19	11.44
18	24¼	15	28½	22	33¾	17⅞	5,000	29,600	Amer. Agric. Chem	No	627,987	1.43	2.23	2.95	1.57
6⅛	11⅞	5¾	15	9	30¾	8¼	3,000	32,400	Amer. Com. Alcohol	No	260,930	....	—2.05	3.23	4.55
25½	29½	21	31½	20	46	22	2,400	10,200	Archer-Dan.-Midland	No	545,416	1.25	.43	5.03	3.05
52	66¾	50⅝	68	36	94	38	1,500	6,700	Atlas Powder Co.	No	249,163	2.25	2.69	4.40	4.21
117	127	116	126¼	105	133	101	200	1,490	5% conv. cum. pfd.	100	68,597	5.00	14.77	20.90	20.85
21¾	24⅜	13⅝	26⅜	9	41¼	13	102,400	304,000	Celanese Corp. Amer.	No	1,000,000	....	.26	2.04	2.33
103	105¼	84	96	82	115	90	1,540	5,070	prior pfd.	100	164,818	7.00	15.05	27.07	27.25
14½	16¼	11½	17	7⅜	25¾	8½	65,700	266,400	Colgate-Palm.-Peet	No	1,962,087	.25	1.77	—.35	1.40
105½	106⅛	101⅞	104¼	78	104½	95	800	8,600	6% pfd.	100	233,098	6.00	21.12	3.21	17.13
87½	93	73	98½	53¾	125¾	65	3,700	20,000	Columbian Carbon	No	537,406	4.00	5.13	8.31	7.48
9⅜	13¾	9⅛	12¼	5⅞	21¼	5	35,100	670,200	Commercial Solvents	No	2,636,878	....	—.11	.60	.85
61⅜	66⅞	54⅞	70¾	53	71¼	50½	16,900	92,400	Corn Products	25	2,530,000	3.00	3.18	2.52	3.86
173	176¾	171	177	162	171½	153	700	3,900	7% cum. pfd.	100	245,738	7.00	39.69	32.96	46.76
24½	32⅜	18⅛	40⅞	25	76⅛	29½	990	10,810	Devoe & Rayn. A.	No	95,000	2.00	—1.72	4.05	4.49
116	135	101½	141	87⅞	159¼	79½	4,000	34,100	Dow Chemical	No	945,000	3.00	3.91	4.15	4.48
149½	156¾	126¼	154¾	90½	180⅜	98	44,300	243,700	DuPont de Nemours	20	11,065,762	3.25	3.74	7.37	7.54
119¼	123⅛	117½	120½	109½	112	107½	1,300	7,600	4½% pfd.	No	500,000	4.50	87.27	165.48	.....
139	142	136¾	138½	130¾	135½	130	2,900	19,100	6% cum. deb.	100	1,092,948	6.00	45.92	81.70	84.21
159	186⅛	138⅛	187	121½	198	144	21,100	155,400	Eastman Kodak	No	2,250,921	6.50	7.54	9.76	8.23
175	183½	175	173	157	164	150	390	1,640	6% cum.	100	61,657	6.00	281.22	362.45	306,64
19¾	30	18¼	32	19⅞	32¼	18	5,400	65,000	Freeport Texas	10	796,380	2.00	1.87	3.30	2.43
7⅝	10⅞	7	12⅛	6¾	19	8½	1,800	63,000	Gen. Printing Ink	1	735,960	.50	.62	1.32	1.32
15⅛	24½	14¾	28½	13	51½	19⅛	8,600	73,700	Glidden Co.	No	829,989	.50	—.29	2.62	3.29
40	47	34	51½	37	58⅛	43	900	4,500	4½% cum. pfd.	50	199,940	2.25	1.03	12.72	15.43
106	109	93	111	76¾	117½	80⅛	1,600	8,700	Hazel Atlas	25	434,409	5.00	4.97	6.67	6.55
67	86	63	87	42¾	92½	50	9,400	51,900	Hercules Powder	No	1,316,710	1.50	1.95	2.97	3.24
132	135½	128½	135¼	126¾	135½	125	1,250	3,450	6% cum. pfd.	100	96,194	6.00	35.31	50.75	48.97
21	29½	16¾	30⅜	14⅜	47½	15	12,500	97,900	Industrial Rayon	No	759,325	.25	.24	.34	2.24
24½	28½	17½	34½	15	64¼	20	4,700	30,800	Interchem.	No	289,618	....	.32	1.44	3.02
102½	103¾	90	98	80	111½	92	1,040	3,980	6% pfd.	100	65,661	6.00	7.39	12.26	18.97
1⅝	3⅛	1½	3⅞	2	9⅛	2	2,200	23,800	Intern. Agricul.	No	436,048	....	....	.16	—1.55
19	27⅝	16	29	15	63½	18¼	1,000	4,500	7% cum. pfd.	100	100,000	2.00	7.01	7.70	.23
46¼	55¾	42¾	57⅝	36⅞	73⅜	37	74,100	651,700	Intern. Nickel	No	14,584.025	2.00	2.09	3.31	2.40
32⅛	34	29	30¾	19½	28¾	19½	1,100	8,300	Intern. Salt	No	240,000	2.00	2.29	2.11	1.70
15½	21½	14½	24	19⅛	36	19¼	1,700	6,000	Kellogg (Spencer)	No	509,213	1.40	.71	2.81	2.62
44½	56¾	36½	58¾	23¼	79	33⅜	16,400	126,600	Libbey Owens Ford	No	2,509,750	1.25	1.57	4.19	4.14
14⅛	19	13½	21½	12⅛	26⅞	14	3,700	41,500	Liquid Carbonic	No	700,000	1.25	1.81	2.37	1.58
23⅞	36	23	36⅞	19¾	41¾	22	5,100	41,900	Mathieson Alkali	No	828,171	1.50	1.01	1.81	1.76
96	111	85¾	110	67	107½	71	7,900	57,200	Monsanto Chem.	No	1,241,816	2.00	2.35	4.40	4.01
118	122½	115	117½	111	109	105	1,020	8,360	4½% pfds.	No	100,000	4.50	31.51	49.99	.....
18⅜	27½	17⅞	31	17⅛	44	18	19,500	184,100	National Lead	10	3,095,100	.50	.75	.95	1.71
170	172¼	165	178½	154	171	153	700	2,800	7% cum, "A" pfd.	100	213,793	7.00	26.03	22.86	33.83
145	145	135	145½	127	150	127	930	3,810	6% cum. "B" pfd.	100	103,277	6.00	35.97	43.77	74.50
10	17⅛	8½	19½	9⅞	41¾	10⅛	20,800	167,100	Newport Industries	1	621,359	....	—.08	2.22	.99
59½	70	50	76¼	40	103¾	51⅛	23,600	96,300	Owens-Illinois Glass	12.50	2,661,204	1.50	2.02	3.51	3.80
58⅞	59½	50⅝	59	39½	65½	43¼	25,300	119,200	Procter & Gamble	No	6,325,087	2.00	2.59	4.08	2.39
117	119¾	112	122¼	114	118½	114½	820	11,010	5% pfd.	100	169,517	5.00	101.81	157.05	94.14
105⅝	15⅛	10⅜	18⅜	10	34¾	14⅞	18,300	96,900	Shell Union Oil	No	13,070,625	.70	.70	1.44	1.35
105¼	107	101	106½	93	105¾	91	1,100	11,200	5½% cum. pfd.	100	341,000	5.50	33.18	60.59	57.20
18¾	29½	18½	34¾	18½	60⅜	26½	2,700	52,100	Skelly Oil	No	995,349	1.00	2.27	6.07	4.42
95	96	92	98	84	102¼	88	1,200	3,200	6% cum. pfd.	100	64,500	6.00	41.09	97.86	73.16
24½	29⅛	23¼	35½	24¾	50	26½	34,200	275,800	S. O. Indiana	25	15,272,020	1.00	1.82	3.16	3.09
41½	53¼	40⅛	58⅜	39¾	76	42	78,800	453,200	S. O. New Jersey	25	26,618,065	1.50	2.86	5.64	3.73
5⅜	6½	4	8	3⅞	15⅜	5¼	17,300	63,500	Tenn. Corp.	5	853,696	....	.46	1.09	.41
36¼	48¼	34⅞	49⅝	37⅝	65⅛	34¾	64,800	408,700	Texas Corp.	25	10,876,882	2.00	2.13	5.02	4.10
26½	32⅝	26¼	38	26	44	23¾	10,800	114,000	Texas Gulf Sulphur	No	3,840,000	2.00	1.81	3.02	2.57
73½	90½	65½	90⅞	57	111	61¼	50,200	302,700	Union Carbide & Carbon	No	9,073,288	2.40	2.77	4.81	4.09
55	65¾	52	73½	39	91	36¾	3,500	24,800	United Carbon	No	397,885	3.25	3.78	5.91	5.54
14¼	25¾	13½	30¼	13½	43⅝	16⅛	4,100	53,400	U. S. Indus. Alcohol	No	391,238	....	—1.08	1.24	—.20
19	30¼	16	28⅞	11½	39⅜	9¼	14,400	154,000	Vanadium Corp. Amer.	No	376,637	....	.61	2.22	.40
22½	25⅞	18¼	25¼	13½	...	...	5,200	42,200	Victor Chem.	5	696,000	.90	1.05	1.01	1.16
2½	4⅞	2½	5⅝	2¾	12¾	2⅝	3,700	45,000	Virginia-Caro. Chem.	No	486,122	....	—1.80	—.05	—2.44
19⅞	31⅞	17	32½	15¾	74⅜	18½	4,300	32,800	6% cum. part. pfd.	100	213,052	....	1.90	5.88	.44
22	23½	15¼	20⅛	10	27¼	10¾	6,900	20,500	Westvaco Chlorine	No	339,362	1.00	1.52	1.46	1.17
32	32¼	29	31½	20	34⅞	21⅛	1,900	10,100	cum. pfd.	30	192,000	1.50	4.19	4.09	3.26
NEW YORK CURB EXCHANGE															
23½	28⅜	18⅜	30¼	15½	37	17⅝	38,400	173,500	Amer. Cyanamid "B"	10	2,520,368	.45	.91	2.09	1.77
94¾	97	76	92	50	124	69	1,000	4,360	Celanese, 7% cum. 1st pfd.	100	148,179	8.53	8.95	22.32	24.47
3	5¼	3	6¾	3	15	3	200	3,225	Celluloid Corp.	15	194,952	....	—2.73	—.92	—.80
5¾	6⅝	4¾	12	6½	14⅜	10½	700	1,300	Courtauld's Ltd.	£1	24,000,000	.29	.26%	8.64%	8.30%
6	7	5	9⅞	6	10⅜	3½	2,300	6,300	Duval Texas Sulphur	No	500,000	....	.71	.43	.61
36½	41½	30	41¾	27	47½	31	700	3,300	Heyden Chem. Corp.	100	149,643	1.50	2.07	3.94	3.56
101	117	90	115¾	55	147½	77	4,600	34,600	Pittsburgh Plate Glass	25	2,142,443	1.75	3.00	8.53	7.15
87	113½	83	117¾	66	154¾	72¼	4,500	21,700	Sherwin Williams	25	638,927	2.50	2.43	8.76	8.04
108¾	115¾	107¼	114⅛	107	114	106¼	360	1,230	5% cum. pfd.	50	132,189	5.00	8.76	45.50	41.44
PHILADELPHIA STOCK EXCHANGE															
151	167	135	167	121½	179	115	325	960	Pennsylvania Salt	50	150,000	4.50	6.90	11.79	8.57

PRICE RANGE June 1939 Last	1939 High	1939 Low	1938 High	1938 Low	1937 High	1937 Low	Sales (June 1939)	Sales 1939	Bonds	Date Due	Int. %	Int. Period	Outstanding $
NEW YORK STOCK EXCHANGE													
101¾	103½	100¾	105⅛	99⅛	109½	99	248,000	1,661,000	Amer. I. G. Chem. Conv.	1949	5½	M-N	$25,300,000
25	26	19	38	25⅛	42½	23	29,000	359,000	Anglo Chilean Nitrate inc. deb.	1967	4½-5	J	12,067,000
105	108⅜	104	106⅛	102⅜	102⅞	100⅛	63,000	157,000	Dow Chemical	1951	3	J-D	5,000,000
103¼	103½	99⅞	102¾	100	102	98½	33,000	144,000	Int. Agric. Corp. 1st Coll. tr. stpd. to 1942	1942	5	M-N	5,633,000
26	27⅜	21½	35⅜	24¾	35⅜	21¼	91,000	849,000	Lautaro Nitrate n inc. deb.	1975	4	J-D	30,500,000
28	35	28	35⅜	24¾	25½	20½	.....	4,000	Ruhr Chem.	1948	6	A-D	1,500,000
102¾	106	102¾	105	96½	102	93	282,000	1,988,000	Shell Union Oil	1951	3½	M-S	58,800,000
102¾	105	102¾	104¾	90¼	102¾	94	40,000	488,000	Skelly Oil	1951	4	J-J	9,000,000
106⅛	106¼	103⅞	105⅜	100	102	95	218,000	1,516,000	Standard Oil Co. (New Jersey) deb.	1961	3	J-D	85,000,000
105½	106½	103	103	98	...	...	351,000	1,572,000	Standard Oil Co. (New Jersey) deb.	1953	2¾	J-J	50,000,000
104¾	108¾	104	103	95	105	93½	602,000	2,405,000	Texas Corp.	1951	3½	J-D	60,000,000
104	105	103¾	107⅜	103½	105¾	100	498,000	498,000	Texas Corp.	1959	3	A-O	40,000,000
100	103½	96	101	77	111	81	30,000	329,000	Vanadium Corp. conv.	1941	5	A-O	2,800,000

* Paid in 1938, including extras but excluding dividends paid in stock. ** For either fiscal or calendar year.

Fats and Oils, 1938-39, p. 5

Fats and Oils, 1938

Distribution of primary animal and vegetable fats and oils consumed in factory operations during the calendar year 1938, by classes of products in which used, is presented in the tabular statement below. In the chart opposite is presented data on the consumption of leading drying oils, by quarters, for 1938, first half, and the 5 years previous. The statistics were compiled from the quarterly reports of the several concerns to the Bureau of the Census, supplemented by special statements covering the entire year for those manufacturing more than one class of products. Data for oleo stock were not collected, hence the secondary products, edible animal stearin and oleo oil, are shown.

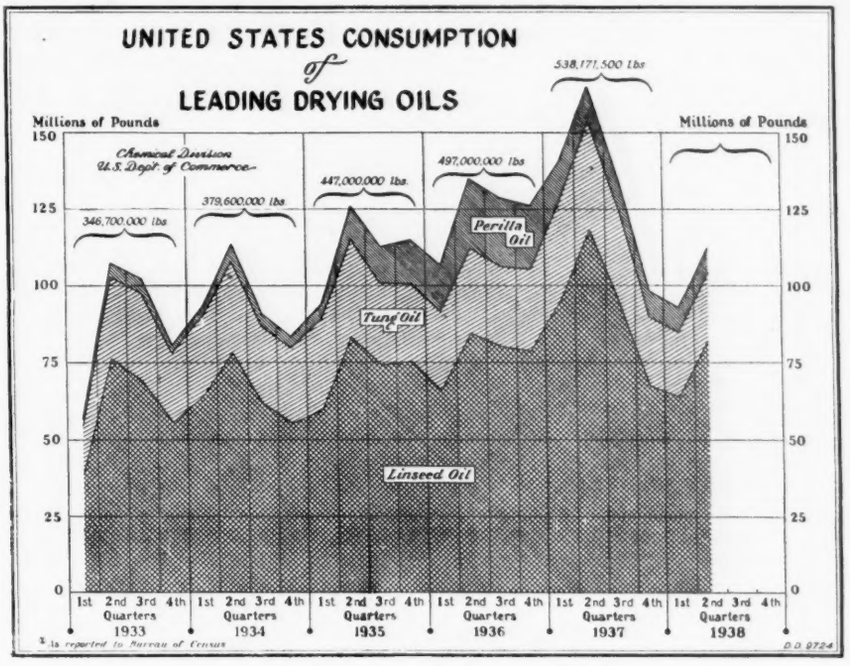
Oils subjected to hydrogenation or other treatment for special uses were reported as consumed in the products for which intended. For example: Oils treated for soap manufacturing were entered in the column headed "Soap," and oils intended for edible purposes were entered in one or more of the columns covering edible products. The ultimate uses of the primary oils are designated in this way.

Industrial consumption of vegetable and other oils by the paint and varnish, linoleum and oilcloth, and printing ink industries decreased nearly 20% to a total of 464,871,000 lbs. from the 586,672,000 consumed during '37, but was more than 60% above the 322,189,000 lbs. reported for the year 1932.

Total consumption of such materials by the paint and varnish industry—chiefly linseed, tung, perilla, fish, and soybean oils (in the order named)—fell nearly 20% from the volume used in '37; the linoleum and oilcloth industry, and printing ink manufacturers likewise took considerably less of these materials during '38.

Consumption of fish oils, tung, castor, and perilla oils by paint and varnish makers fell sharply last year, when compared with figures for '37 requirements. On the other hand, use of soybean oil declined but relatively little. Substantially more soy bean oil was consumed in '38 by the shortening and oleomargarine industry, than was taken for this purpose in the previous year. Linoleum and oilcloth processes used nearly 25% less tung and fish oils in '38, but took larger tonnages of the miscellaneous vegetable oils (including hempseed and sunflower oils) than they did in '37. Printing inks consumed less of all fat and oil materials in substantially equal proportions.

In 1938, tung oil consumption dropped more than 30%, as compared with 1937, according to C. C. Concannon, Chief, Chemical Division, Bureau of Foreign and Domestic Commerce. 80,000,000 lbs. of tung oil were consumed last year, a



FACTORY CONSUMPTION OF PRIMARY ANIMAL AND VEGETABLE FATS AND OILS, BY CLASSES OF PRODUCTS, 1938

(Quantities in thousands of lbs.)

KIND	TOTAL	Shortening	Oleomargarine	Other Edible Products	Soap	Paint and Varnish	Linoleum and Oilcloth	Printing Inks	Miscellaneous Products	Loss including Foots
Total	4,639,135	1,517,299	310,936	377,055	1,468,535	357,625	85,362	21,884	264,877	235,562
Cottonseed oil	1,539,990	1,051,347	142,857	198,155	2,883	184	.....	168	2,971	141,425
Peanut oil	62,461	52,402	3,593	1,920	545	.....	.....	.....	32	3,969
Coconut oil	555,017	26,199	89,521	61,493	342,982	422	.....	2	3,572	30,826
Corn oil	72,770	399	566	57,104	2,514	118	.....	.....	3,345	8,724
Soybean oil	237,428	137,133	39,885	11,280	10,897	15,183	3,605	59	5,340	14,046
Olive oil, edible	2,990	.....	.....	2,850	31	.....	.....	.....	109	.....
Olive oil, inedible	.....	.....	.....	.....	1,299	6	.....	.....	2,943	.....
Sulfur oil or olive foots	15,378	.....	.....	.....	15,013	.....	.....	.....	365	.....
Palm-kernel oil	51,962	614	4,746	13,118	29,498	.....	.....	.....	40	3,946
Palm oil	253,150	115,033	.....	444	91,642	1	.....	9	19,905	26,116
Babassu oil	32,468	950	11,545	8,969	8,289	.....	.....	.....	.....	2,715
Rapeseed oil	5,317	297	.....	.....	55	131	2	1	4,831	.....
Linseed oil	298,481	6	.....	.....	1,455	216,568	55,395	16,804	8,253	.....
Tung (China wood) oil	87,415	.....	.....	.....	.....	78,310	4,131	2,084	2,890	.....
Perilla oil	32,649	.....	.....	.....	.....	23,528	6,952	1,762	407	.....
Castor oil	28,160	.....	.....	.....	1,810	5,283	1,313	200	19,554	.....
Sesame oil	7,568	5,435	.....	1,573	302	.....	.....	.....	24	234
Other vegetable oils	31,952	695	70	6,525	14,031	1,912	115	106	7,304	1,194
Lard	9,925	2,825	1,464	5,518	1	.....	.....	2	20	95
Edible animal stearin	41,616	32,845	3,278	5,074	240	.....	.....	.....	144	35
Oleo oil	14,235	291	13,411	40	119	2	.....	.....	323	49
Tallow, edible	78,320	74,251	.....	2,992	332	.....	.....	2	557	186
Tallow, inedible	764,041	.....	.....	.....	702,267	117	.....	4	61,437	216
Grease	182,767	.....	.....	.....	96,356	144	1	420	85,083	763
Neat's-foot oil	4,757	.....	.....	.....	20	9	.....	2	4,726	.....
Marine animal oils	70,664	48	.....	.....	66,080	28	.....	5	4,467	36
Fish oils	153,406	16,529	.....	.....	79,874	15,679	13,848	254	26,235	987

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PRINCIPAL VEGETABLE OILS, PRODUCTION, CONSUMPTION, STOCKS, 1938*

	Production		Consumption		Stocks	
	1938	1937	1938	1937	Dec. 31, 1938	Dec. 31, 1937
Cottonseed, crude	1,682,991,109	1,628,672,352	1,706,539,803	1,562,674,540	497,693,122	200,643,988
Cottonseed, refined	1,564,829,316	1,450,319,085	1,435,586,447	1,573,248,788	2,091,213,450	447,576,407
Peanut, crude	77,382,286	50,724,281	71,011,375	58,461,980	24,516,269	4,311,751
Peanut, refined	66,698,101	64,494,445	58,150,292	57,130,890	82,883,404	19,163,280
Coconut, crude	286,850,169	266,419,787	578,155,325	453,125,749	777,917,764	165,993,655
Coconut, refined	315,327,136	268,067,067	292,313,831	241,965,550	52,217,280	10,542,683
Corn, crude	134,874,481	126,095,341	144,645,456	156,160,324	45,233,219	8,912,271
Corn, refined	131,099,028	140,107,224	59,639,415	67,765,022	41,009,061	8,889,264
Soybean, crude	322,067,147	194,132,315	275,258,158	158,118,550	198,267,311	44,897,441
Soybean, refined	242,860,377	133,472,517	217,222,545	153,774,524	86,751,121	16,508,560
Palm-Kernel, crude	.....	.....	50,703,914	139,234,131	35,596,513	41,033,767
Palm-Kernel, refined	18,284,719	26,202,260	19,539,194	31,005,188	7,144,978	787,595
Rapeseed	.....	.....	5,326,980	14,761,404	12,920,269	5,064,936
Linseed	440,614,136	665,098,850	298,921,178	374,468,861	623,814,723	191,386,262
China wood or tung	.....	.....	87,648,700	120,361,467	229,587,936	48,484,511
Perilla	.....	.....	32,765,537	43,310,497	75,156,952	23,716,308
Castor	52,272,923	68,823,645	28,179,881	35,101,773	71,216,556	18,654,103
Palm	.....	.....	384,598,597	363,281,348	626,136,464	154,280,509
Sesame	.....	.....	6,695,772	37,667,407	3,857,503	5,484,841
Babassu	49,067,458	35,678,179	52,031,342	41,062,096	18,107,526	3,186,047

* Source Quarterly Statements, Bureau of the Census; all figures in pounds.

figure comparing poorly with the more than 120,000,000 lbs. taken in '37. The '38 figure is reported the lowest in 6 years. Soybean extracts, however, were used in nearly 30% greater volume last year, than in '37. Factory consumption of linseed oil dropped 20% in '38, and perilla oil dropped nearly 25% in that year, as compared with '37. During '38, stocks of the leading drying oils rose to extremely large volume during the mid-year months, but decreased to more nearly normal quantities by the end of December.

Stocks

Stocks of the principal vegetable oils rose to unusually large volumes at the close of '38. Cottonseed refined oil stocks were nearly five times as large on Dec. 31, '38, as they were on that day in '37. Stocks of other refined vegetable oils, including peanut, coconut, corn, soybean, and palm-kernel, were all from 4 to 6 times greater last December than in the like '37 month. Palm-kernel refined oil volume was about 9 times as great, but that of the crude palm-kernel oil was about 5,500,000 lbs. less, on Dec. 31, '38, than on the last day of the previous year. Sesame oil supplies were reduced one-third during '38, there being less than 4,000,000 lbs. on hand at the beginning of 1939. Linseed oil production, which fell off sharply during the middle months of '38, increased rapidly in the fall and winter. Linseed stocks increased correspondingly, but began to diminish in the winter months. Data on linseed oil production and consumption are presented separately in the adjacent statement. The table above gives figures for the production, consumption, and stocks of principal vegetable oils, as of Dec. 31, 1938.

Drying Oil Imports

Of the 5 major drying oils—linseed, tung, perilla, soybean, and oiticica—only the last survived the general slump in drying oil imports. Oiticica oil imports, on the contrary were about 45% greater last year. Important factor in the drying oil field is the matter of substitutes, according to Mr. Concannon; uncertainty over future supplies of oils leads to the use of substitutes such as combinations of various other oils that allow of chemical processing into desirable products. Consumption of tung oil, however, has been unaffected by the use of substitute oils despite present difficulties. Castor oil, except for the inadequate supplies of the bean and consequent high price, would meet with considerably greater demand, it is stated. Serious attempts are being made by tung nut growers in the South to establish a domestic, dependable tung oil source. The tung crops have, in practically every alternate year, been radically depleted by frosts. In the good years of '32, '34, '36, and '38 some 4,000,000 lbs. of tung oil were obtained—exact figures are not yet available on U. S. production.

Meanwhile, with the erection of new roads throughout southern China, shipments of tung oil are assured for the time being. Goods received at Haiphong are now being transshipped to Hong Kong; stocks in interior China are said to be ample, although transfer remains a round-about system.

U. S. PRODUCTION LINSEED OIL**

Year	Total Pounds	Jan. 1 to March 31. Pounds	April 1 to June 30. Pounds	July 1 to Sept. 30. Pounds	Oct. 1 to Dec. 31. Pounds
1939	.....	139,209,234	.....	.....	.....
1938	440,614,136	125,587,390	77,513,277	98,407,203	139,106,266
1937	665,098,850	156,877,263	206,511,823	151,278,120	150,431,644
1936	455,959,464	132,136,919	100,118,519	91,805,153	131,898,873
1935	502,043,424	111,822,663	116,946,404	116,666,553	156,607,804
1934	370,768,585	97,451,809	98,025,913	85,037,681	90,253,182

U. S. CONSUMPTION LINSEED OIL*

Year	Total Pounds	Jan. 1 to March 31. Pounds	April 1 to June 30. Pounds	July 1 to Sept. 30. Pounds	Oct. 1 to Dec. 31. Pounds
1939	.....	76,673,550	.....	.....	.....
1938	298,921,178	63,874,555	81,891,716	80,735,553	72,419,354
1937	374,468,851	94,980,998	118,260,108	93,816,524	67,411,221
1936	305,329,679	65,128,254	82,397,832	79,701,761	78,101,802
1935	291,683,903	59,406,538	83,082,616	73,809,240	75,385,509
1934	258,483,721	63,519,296	78,167,202	61,677,514	55,119,709

* Bureau of the Census, Dept. of Commerce.

** Represents oil recovered from both imported and domestically produced flaxseed.

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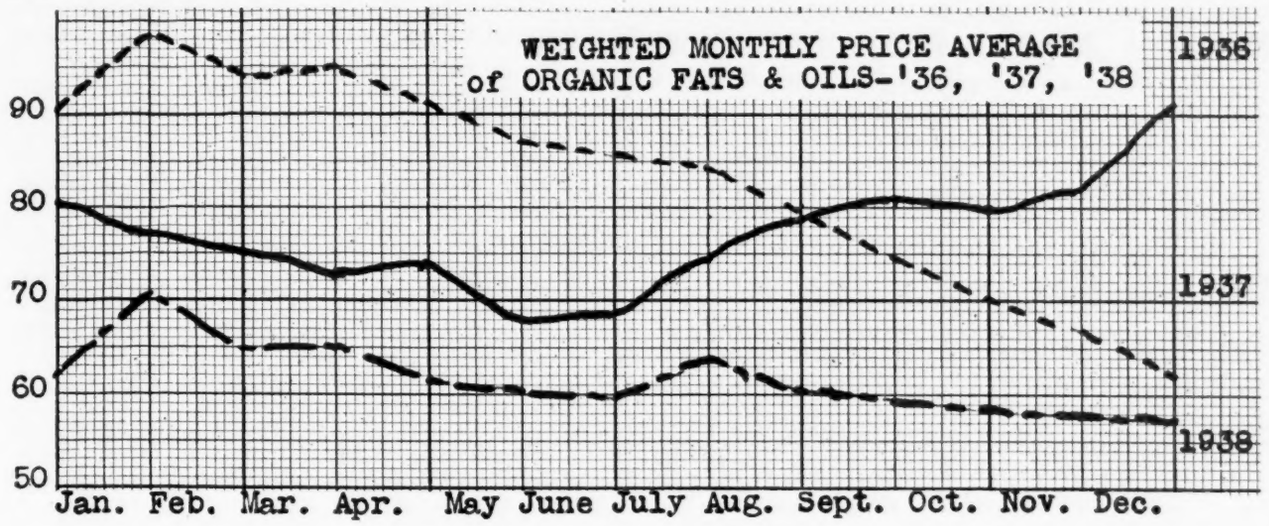
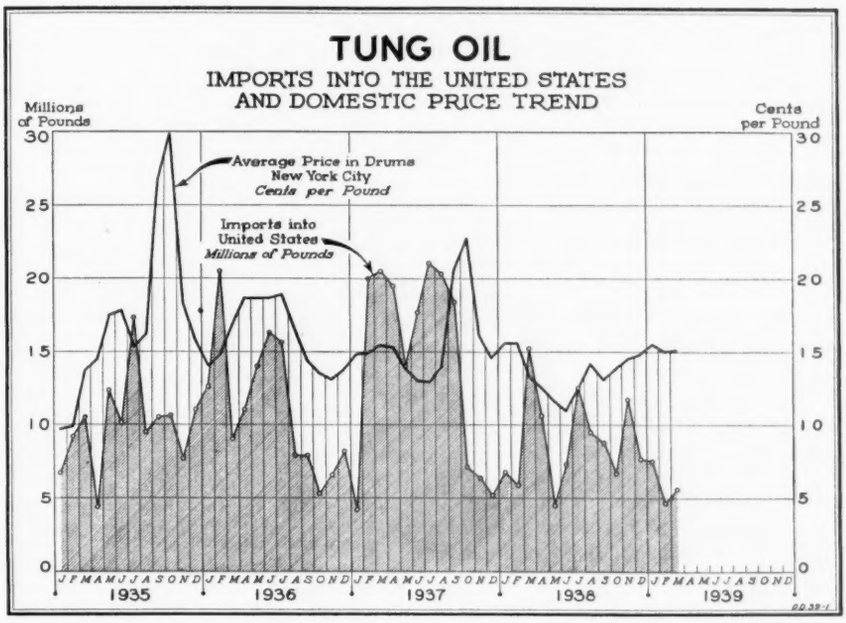


Prices

The chart above compares the trend of fat and oil prices during the last three years. The weighted monthly price averages are based on the 1926 compilations.

In the accompanying table and graph are recorded '38 price indices for the several fats and oils, computed by the Bureau of Raw Materials for American Vegetable Oils and Fats Industries. The normal average is taken on the basis of '26 data. During '38, fat and oil prices tended to be from about 10-20% below corresponding '37 levels. Month-to-month inspection of the '38 values shows that most items decreased slightly during the latter half of the year; tung oil prices swung sharply upwards during the fall and winter months of last year—which trend continues in '39. Castor oil prices remained substantially the same during '38, although they have tended to fall gradually during the last 2 years.


TUNG OIL
IMPORTS INTO THE UNITED STATES
AND DOMESTIC PRICE TREND
Millions of Pounds
Cents per Pound
Average Price in Drums New York City
Cents per Pound
Imports into United States
Millions of Pounds
30
25
20
15
10
5
0
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1935
1936
1937
1938
1939

AVERAGE MONTHLY PRICE INDEX OF ORGANIC OILS AND FATS

(Base period 1926)

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Grease	65.3	63.9	58.0	51.7	50.2	53.7	63.3	63.8	63.1	62.4	65.3	64.7
Lard	59.9	61.8	61.8	58.1	57.7	58.3	62.1	56.7	55.9	52.8	51.1	49.3
Castor oil	73.3	73.3	73.3	73.3	73.3	73.3	73.3	73.3	73.3	73.3	73.3	73.3
China wood oil	116.1	110.7	93.3	89.5	79.3	78.7	94.0	99.8	92.0	103.9	107.4	110.4
Coconut oil	42.8	40.2	38.7	35.3	35.0	33.4	35.6	33.6	34.0	33.3	32.4	32.4
Cod oil	83.8	83.8	81.9	80.7	80.7	80.7	75.8	61.3	61.3	61.3	56.5	56.5
Corn oil	69.0	74.6	77.3	72.6	71.2	72.3	77.3	81.7	72.6	69.4	65.4	65.3
Linseed oil	93.2	91.4	88.7	86.5	83.7	78.5	78.3	75.4	77.7	78.6	75.5	78.1
Menhaden oil	78.4	78.4	76.3	73.2	73.2	63.2	59.1	62.7	62.7	62.7	62.7	64.7
Oleo oil	76.9	74.9	72.2	70.4	67.0	67.8	72.9	75.7	74.0	72.5	70.6	68.5
Olive oil	92.1	84.9	83.4	75.2	74.2	72.1	75.9	76.9	76.9	75.0	70.0	74.2
Olive oil foots	107.8	106.0	103.0	98.4	95.4	91.6	92.6	87.7	82.9	82.2	82.2	82.6
Palm oil	48.2	48.0	45.8	40.7	39.6	38.6	38.3	38.3	36.3	36.3	36.6	38.3
Palm kernel oil	47.9	47.2	46.2	44.6*	46.8	46.8	46.8	42.3	41.1	41.1	39.3	38.3
Peanut oil	55.3	53.8	61.8	58.9	58.1	57.4	63.7	62.5	59.0	56.8	55.1	54.8
Rapeseed oil	106.3	106.3	105.3	101.6	98.4	91.7	91.0	91.0	91.0	92.8	94.7	94.3
Sardine oil	84.0	91.6	94.5	80.8	75.6	73.6	61.3	60.0	57.2	57.2	60.1	63.2
Sesame oil	75.6	75.6	75.4	74.7	74.7	75.6	76.0	76.5	76.5	76.5	76.5	76.5
Soybean oil	57.3	61.1	70.4	57.9	56.2	55.7	58.7	56.8	52.4	51.8	51.8	51.8
Whale oil	91.3	91.3	91.3	91.3	91.3	86.3	81.3	78.5	75.0	75.0	75.0	75.0
Stearin, oleo	62.8	61.2	62.0	54.1	48.9	50.9	63.0	67.3	64.9	61.7	56.0	56.6
Tallow	69.0	62.5	60.1	55.1	53.2	53.9	62.1	63.1	61.3	61.1	62.9	63.2
Cottonseed oil	62.3	66.9	72.7	70.6	70.6	70.4	74.2	67.9	66.2	66.6	65.9	64.8
Weighted average	70.7	65.0	65.2	61.6	60.6	60.2	63.9	60.6	59.5	58.6	57.9	57.5

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First Quarter Figures

Factory production of fats and oils (exclusive of refined oils and derivatives) during the 3-month period ending Mar. 31, '39, was as follows: Vegetable oils, 990,933,350 lbs.; fish oils, 47,713,193 lbs.; animal fats, 501,164,683 lbs.; and greases, 86,418,786 lbs.—a total of 1,626,230,012 lbs. Of the several kinds of fats and oils covered by this survey, largest production, 390,779,958 lbs., appears for cotton seed oil. Next in order is lard, with 341,523,959 lbs.; tallow, with 158,360,832 lbs.; linseed oil, with 139,209,234 lbs.; soybean oil, with 121,289,014 lbs.; coconut oil, with 75,456,686 lbs.; corn oil, with 33,130,367 lbs.; peanut oil, with 27,892,000 lbs.; castor oil, with 17,544,061 lbs.; and babassu oil, with 14,746,585 lbs.

Production of refined oils during the period was as follows: Cottonseed, 380,469,335 lbs.; soybean, 91,919,309 lbs.; coconut, 75,063,517 lbs.; palm, 38,610,608 lbs.; corn, 34,844,530 lbs.; peanut, 26,105,631 lbs.; babassu, 7,312,294 lbs.; and palm-kernel, 2,315,240 lbs. Quantity of crude oil used in the production of each of these refined oils is included in the figures of crude consumed.

Complete data on fats and oils for the first quarter of '39 appear in the opposite statement.

Stocks of tung, perilla, linseed, and other oils were materially depleted during the first quarter of '39. During the early months of this year Chinese ports sent out over 12,143,043 lbs. tung oil, of which the U. S. took about 80%. Balance of these exports, made principally from Hankow, Shanghai, and Hong Kong, were consigned to European countries. Japan has been taking relatively little of the tung output, according to reports made to the Chemical Division, U. S. Dep't. of Commerce. Chinese and independent dealers in the Far East are said to have had on hand over 15,400 tons (30,800,000 lbs.) at the end of April. Abundant deliveries of tung oil during February and March allowed prices to slip off somewhat; February's index, 110.0, was 3.4 points below January's mark and, in March, the index rose to only 111.2. In the second quarter of this year the index increased steadily, the May level standing at 130.0. During the first 6 months of '39, spot N. Y. prices have been forced up nearly 40%. January's tung oil market (N. Y. spot, per lb.) stood at 15c, on tank basis; at the end of June, this item was quoted at 20c minimum.

For comparable statistics for earlier years refer to Statistical & Technical Data Section, June, '38, pages 727-730.

PRODUCTION, CONSUMPTION AND STOCKS OF FATS AND OILS

Kind	Factory operations for the quarter ending March 31, 1939 Production (pounds)	Factory operations for the quarter ending March 31, 1939 Consumption (pounds)	Factory and Warehouse stocks March 31, 1939 (pounds)
Vegetable Oils (1)			
Cottonseed, crude	390,779,958	402,674,363	177,466,454
Cottonseed, refined	380,469,335	285,230,243	642,463,418
Peanut, virgin and crude (4)	27,892,000	27,092,419	9,168,116
Peanut, refined	26,105,631	15,947,666	25,769,686
Coconut, crude	75,456,686	154,407,550	202,322,310
Coconut, refined	75,063,517	64,957,105	13,735,218
Corn, crude	33,130,367	39,627,559	14,214,312
Corn, refined	34,844,530	20,577,518	10,092,056
Soybean, crude	121,289,014	102,697,936	55,560,653
Soybean, refined	91,919,309	75,111,213	33,099,988
Olive, edible	6,503,720	530,121	8,311,862
Olive, inedible	.....	1,251,641	1,049,207
Sulfur oil or olive foots	.....	5,007,175	9,340,130
Palm-kernel, crude	(2)	5,445,891	768,220
Palm-kernel, refined	2,315,240	3,003,419	2,205,816
Palm, crude	.....	74,957,043	126,080,504
Palm, refined	38,610,608	36,639,706	21,551,358
Babassu, crude	14,746,585	12,256,862	4,195,977
Babassu, refined	7,312,294	5,509,728	566,896
Rapeseed	.....	1,329,722	3,244,060
Linseed	139,209,234	76,673,550	161,250,997
China wood or tung	1,085,150	25,717,024	53,712,099
Perilla	.....	9,439,073	11,188,637
Castor	17,544,061	8,820,374	17,918,080
Sesame	(2)	431,148	717,096
All other	3,895,842	10,123,133	13,927,721
Fish Oils (1)			
Cod and cod-liver	422,116	4,151,753	24,662,327
Other fish oils (3)	24,198,577	49,027,219	117,699,150
Marine animal oils	23,092,500	13,332,630	100,363,354
Animal Fats:			
Lard, neutral	622,622	466,895	419,763
Lard, other edible	340,901,337	3,470,355	133,286,439
Tallow, edible	25,077,586	18,816,615	7,474,310
Tallow, inedible	133,283,246	209,321,191	204,155,590
Neat's-foot oil	1,279,892	1,380,753	985,291
Greases:			
White	16,001,263	10,833,735	8,377,898
Yellow	21,971,382	11,510,499	11,335,288
Brown	14,520,214	11,301,916	12,376,203
Bone	6,050,736	365,617	1,120,746
Tankage	11,609,426	1,458,759	2,976,067
Garbage or house	10,938,268	6,216,356	10,126,687
Wool	1,194,413	1,230,277	3,141,688
All other	4,133,084	5,265,222	4,715,805
Other Products:			
Shortening	354,691,761	220,700	51,163,083
Hydrogenated oils	204,366,652	192,611,866	26,422,748
Stearin, vegetable	22,746,458	22,530,113	10,068,770
Stearin, animal, edible	10,177,758	8,955,852	4,026,288
Stearin, animal, inedible	3,390,538	2,527,020	1,880,427
Oleo oil	18,422,660	3,913,606	4,057,057
Lard oil	5,589,726	2,676,575	7,487,645
Tallow oil	1,503,892	1,151,900	1,417,916
Fatty acids	35,875,454	31,129,072	9,881,391
Fatty acids, distilled	7,602,322	4,555,382	3,971,322
Red oil	11,385,296	8,173,142	7,966,961
Stearic acid	8,042,253	3,126,668	4,310,232
Glycerin, crude 80% basis	42,445,808	44,921,858	15,325,092
Glycerin, dynamite	13,234,156	7,785,410	23,542,575
Glycerin, chemically pure	22,432,968	5,927,673	48,884,466
Cottonseed foots, 50% basis	39,890,474	37,657,786	19,094,173
Cottonseed foots, distilled	16,952,268	14,798,006	4,689,376
Other vegetable oil foots, 50% basis	37,572,616	29,197,581	5,216,209
Other vegetable oil foots, distilled	.....	124,865	30,073
Acidulated soap stock	17,685,345	29,668,369	46,599,567
Miscellaneous soap stock	323,860	1,655,696	1,550,519

(1) The data of fish oil producers and fish canners collected by Bureau of Fisheries.
(2) Included in "All Other" vegetable oils.
(3) Includes 22,768,447 pounds herring and sardine, and 178,020 pounds menhaden.
(4) The data of peanut oil producers collected by Bureau of Agricultural Economics.

U. S. Chemical Patents

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A Complete Check-List of Products, Chemicals, Process Industries

Agricultural Chemicals

Process converting peat into a humus fertilizer. No. 2,158,918. Charles Samuel Townsend, Ealing, England, to Wellesley Holdings, Limited, London, England.

Artificial soil construction, comprising a layer of top soil, a layer of clay beneath, and the latter supported by a web of waterproofed woven fabric disposed beneath the clay, said woven layer being supported by the earth. No. 2,158,952. Journey F. Timberlake, Charlottesville, Va.

New compound of the formula 3 $CuAs_2O_4$. CuOR, where R is the anhydride of a sulf-monocarboxylic acid of the formula $C_nH_{2n}{}_2SO_2$. No. 2,159,585. Frederick E. Dearborn, Washington, D. C., dedicated to the free use of the People of the United States of America.

Fodder preservative, a mixture of water-soluble nitrite and a non-toxic formate. No. 2,160,167. Gustav Pfeiffer, Bonn-on-the-Rhine, Germany to Winthrop Chemical Co., Inc., New York City.

Fodder preservative, a mixture of water-soluble nitrite and a non-toxic acid amide. No. 2,160,168. Gustav Pfeiffer, Bonn-on-the-Rhine, Germany, to Winthrop Chemical Co., Inc., New York City.

Manufacture a phosphate-sulfur fertilizer material. No. 2,161,035. Howard W. Gilbert, Washington, D. C., to Freeport Sulphur Co., New York City.

Parasiticide for pharyngeal administration to birds affected with gapeworms, comprising essentially a sparingly soluble antimonyl tartrate salt. No. 2,161,261. Jacob M. Schaffer, Laurel, Paul D. Harwood, College Park, and Everett E. Wehr, Takoma Park, Md.; dedicated to the free use of the People in the territory of the United States.

Manufacture a non-dusting calcium cyanamide. No. 2,161,328. Ernst Winter, Braunsfeld, Cologne, and Herbert Polack, Knapsack, Cologne, Germany, to Atkiengesellschaft fur Stickstoffdunger, Knapsack, near Cologne-on-the-Rhine, Germany.

Cellulose

Method affixing to a cellulose derivative surface of a body a water-energizable adhesive surface of a second body, comprising applying between said surfaces a liquid composition a mixture of a cellulose derivative and a softener for same. No. 2,159,108. Ambrose W. Staudt, Kenmore, N. Y., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Thermo-stabilization of cellulose ethers, by subjecting their solution in an organic solvent non-reducible by hydrogen to hydrogen at 300-1,000 p.s.i. at 100-200 deg. C., in the presence of a catalyst, and then recovering the so-treated cellulose ether. No. 2,159,367. Shailer L. Bass and Howard N. Fenn, Midland, Mich., and Floyd C. Peterson, Syracuse, N. Y., to The Dow Chemical Co., Midland, Mich.

Production cellulose ethers by subjecting to the action of sulfur dioxide, chlorine, or anhydrous gaseous hydrogen halide the air-dried cellulose; latter is aged in the presence of the reagent gas, converted to alkali cellulose and this last immediately etherified. Nos. 2,159,375-6-7. Richard D. Freeman and Martin J. Roberts, to The Dow Chemical Co., all of Midland, Mich.

An ethyl cellulose-nitrocellulose composition. No. 2,159,384. Toivo A. Kauppi, to The Dow Chemical Co., both of Midland, Mich.

Method stabilizing cellulose ethers, comprising the treatment with formaldehyde of a slightly alkaline cellulose ether suspension, and heating the mixture in a closed vessel at 100-170 deg. C. No. 2,159,399. Floyd C. Peterson, Syracuse, N. Y. and Howard N. Fenn, Midland, Mich., to The Dow Chemical Co., Midland, Mich.

Method for solution of alkali-soluble cellulosic material iced aqueous alkali solutions. No. 2,160,106. Robert W. Maxwell to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Method manufacturing low-substituted cellulose ethers. No. 2,160,107. Robert W. Maxwell and Joseph Harrell Shipp, to E. I. du Pont de Nemours & Co., all of Wilmington, Del.

Manufacture water-soluble cellulose ethers from alkali cellulose. No. 2,160,782. Albert T. Maasberg, to The Dow Chemical Co., both of Midland, Mich.

Processing of cellulose with fatty acid, chloracetic acid, and an anhydride of a fatty acid; said fatty acids having from 2 to 4 carbon atoms. No. 2,161,555. Loring W. Blanchard, Jr., to Eastman Kodak Company, both of Rochester, N. Y.

Chemical Specialty

High pressure lubricant, comprising a lubricating oil or grease containing a small amount of aliphatic acid-ester of a dibasic organic acid, the alkyl group having at least 6 carbon atoms. No. 2,158,096. James H. Werntz, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Insecticide, commercially pure rotenone in a chloroform liniment containing 30% chloroform, and 70% camphor soap liniment. No. 2,158,241. Sisto E. Marsico, Aspinwall, Pa.

Parasiticidal spray, for application to plant surfaces, an oleaginous water-soluble mixture containing about 98% hydrocarbon oil and about 2% emulsifier (sulfonated naphthenic acid, free naphthenic acid, and n-butyl acetate). No. 2,158,371. Frank F. Lindstaedt, Oakland, Calif.

Lubricating oil, consisting of mineral lubricant containing a small proportion of extract, the raffinate from a blown and polymerized fatty oil mixture taken up with a solvent of the group, acetone, propyl and butyl alcohols. No. 2,158,389. Charles Cole Towne, Beacon, N. Y., to The Texas Company, New York City.

"Blue print" paper having on its surface a non-acid coating comprising a soluble iron salt, an iron-cyanogen compound, a buffer salt, and a soluble nitrile; suited to the semi-dry development process. No. 2,158,422. John Holden, Reddish, Stockport, England.

A smoking tobacco, coated with wax. No. 2,158,565. Andrew T. Andrews, Rahway, N. J., one-half to Standard Commercial Tobacco Co., Inc., New York City.

Hair tonic, comprising alcohol, olive oil and kerosene, the kerosene in sufficient amount to effect a clear solution of the other ingredients. No. 2,158,791. Domenico Caimi and Agostino Caimi.

Dry, wettable sulfur product comprising a mixture of finely-divided sulfur and an alkaline licorice extract which has been thoroughly and homogeneously mixed to a dry, granular mass. No. 2,158,899. Roy M. Gideon, Palmyra, N. J., to MacAndrews and Forbes Co., Camden, N. J.

Wrapping tissue comprising a transparent, non-fibrous, cellulosic base sheet, a transparent moistureproof coating on said base sheet, and interposed between the former a transparent anchoring medium, comprising a resin of the phenol-aldehyde and urea-aldehyde class. No. 2,159,007. William Hale Church and Dorothy E. Bateman, Buffalo, N. Y., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Insecticidal composition, containing a nitro-substituent of a phenyl benzyl ether. No. 2,159,025. William F. Hester, Drexel Hill, Pa., to Rohm & Haas Co., Philadelphia, Pa.

Alcoholic beverage containing 3-60% alcohol having dissolved therein an organic acid ester of a carbohydrate of the type $(C_6H_{10}O_5)_n$, the inebriating capacity of the beverage being reduced thereby. No. 2,159,167. Leon Lilienfeld, Vienna, Austria.

An opaque paraffin wax, containing 0.5-50% of a hydrogenated vegetable oil. No. 2,159,218. Frederick H. MacLaren, Calumet City, Ill., to Standard Oil Co., Chicago, Ill.

Washing composition, consisting of a water-soluble salt of pyrophosphoric acid and a water-soluble aliphatic-sulfonic acid salt. No. 2,159,381. Kurt Jochum, Frankfort-on-the-Main, Hermann Geier, Zittau, and Karl Pauser, Frankfort-on-the-Main, Germany, to General Aniline Works, Inc., New York City.

Sprayable vibration-damping material, comprising blown asphalt, filler particles of sand, and a volatile extender that is an imperfect solvent for asphalt forming therewith a livered mixture. No. 2,159,487. Herman H. Nies, Waukegan, Ill., to Johns-Manville Corp., New York City.

Insecticidal repellant, intended as a coating for surfaces exposed to water embodying the juices of plant life, consisting substantially of catechutannic acid. No. 2,159,550. James R. Cross, one-half to T. Frank Hobson, both of St. Petersburg, Fla.

Roofing material, comprising a compressible fibrous web material filled and sealed with a bituminous saturant. No. 2,159,586. Harold W. Greider, Wyoming, and George Arthur Fasold, Cincinnati, Ohio, to The Philip Carey Manufacturing Co., a corp. of Ohio.

Plant spray, comprising essentially a normally liquid hydrocarbon oil, and an emulsifying amount of high-acid fish oil; latter is a neutralization product obtained from sulfuric acid sludges of fish-oil refining. No. 2,159,611. Arthur E. Allum, Jr., Garden Grove, Calif., to Shell Development Co., San Francisco, Calif.

Adhesive, comprising acetic acid, water, dextrin, and a polyhydroxy alcohol consisting of sorbitol. No. 2,159,613. Paul B. Davidson, Wilkinsburg, Pa., and Julius R. Adams, Westfield, Mass., to Old Colony Envelope Co., Westfield, Mass.

A method of packaging to prevent mold growth in contents, comprising the application to the wrapping of a regenerated cellulose pellicle which has been pretreated with a solution containing a mold inhibitive agent, as formaldehyde or thioformaldehyde. No. 2,159,743. George H. Latham and James K. Hunt, to E. I. du Pont de Nemours & Co., all of Wilmington, Del.

Brake lining material, comprising a finely-divided, hard refractory material incorporated in fibrous matter with a thermo-setting resin. No. 2,159,935. Vernon H. Sanders, St. Marys, Pa., to Stackpole Carbon Co., St. Marys, Pa.

Insecticide, comprising wine dregs, capsicum, African bitter gourd juice, nicotine, and strong alkali soap. No. 2,159,953. Giuseppe Proetto, Philadelphia, Pa.

Pressure-transfer liquid, consisting of castor oil, a glycol ether, and an acetic acid ester of polyhydric alcohol containing before esterification not more than 3 hydroxyl groups. No. 2,160,095. William Percival Smith, London, England.

Fireproof match capable of being stained or printed, comprising a combustible head and a stem impregnated with a fire-proofing phosphoric acid aryl ester. No. 2,160,115. William W. Bell, Tenafly, N. J., to Celluloid Corp., of New Jersey.

An adherent lime soap grease, comprising the mixture of a lubricating oil containing a lime soap with lubricating oil dispersion of rubber. No. 2,160,162. Arnold J. Morway, Roselle and John C. Zimmer, Hillside, N. J., to Standard Oil Development Co., of Delaware.

Baking powder, having for essential acid constituent finely-divided, anhydrous mono-calcium phosphate containing less than 10% pyrophosphate. No. 2,160,233. Julian R. Schlaeger, Chicago Heights, Ill., to Victor Chemical Works, a corp. of Illinois.

A motor oil non-corrosive to bearing alloys of the type cadmium-silver, cadmium-nickel, and copper-lead; oil comprises an aryl, alkyl, or aralkyl derivative of one of the group consisting of azoles, azines, pyrroles, and thiophenes. No. 2,160,293. Bernard H. Shoemaker and Clarence M. Loane, Hammond, Ind., to Standard Oil Co., Chicago, Ill.

Oxygen-liberating composition, comprising alkali peroxide, alkali peroxide hydrate, and a water-supplying copper oxychloride hydrate catalyst. No. 2,160,542. Kurt A. Gerson, London, England.

Lubricating oil, consisting of white lead (200 parts), an ingredient of the group consisting of sulfurized lard, fish, corn, and cottonseed oils (50 parts), an oil from the group including mineral, rapeseed, cottonseed, corn, lard, sperm, and whale oils (51 parts), and one of the group including a chlorinated alkyl or aryl compound. No. 2,160,577. Oscar L. Maag, Canton, O., to Timken Roller Bearing Co., Canton, O.

Insecticidal composition, comprising the additive ether of ethylene glycol and turpentine, a contact insecticide extracted from a plant body, and a carrier. No. 2,160,579. Friar M. Thompson, Jr., to Hercules Powder Co., both of Wilmington, Del.

A baking powder having as the essential acid ingredient unground, crystalline, anhydrous monocalcium phosphate of particle size less than 100 mesh. No. 2,160,701. William H. Knox, Jr., Nashville, Tenn., to Victor Chemical Works, a corp. of Illinois.

Fungicidal soap, comprising cake soap having incorporated therein sodium thiosulfate and a relatively small amount of copper sulfate. No. 2,160,834. Sewell M. Corbett, Fort Bragg, N. C.

Petroleum oil distillate stabilizer, comprising a dithiocarbamic acid derivative. No. 2,160,851. Jacob Faust, Belleville, N. J., to L. Sonneborn Sons, Inc., of Delaware.

Composition of matter, comprising a protein, water-soluble fluoride, lime, Canada balsam, and a solvent of said balsam. No. 2,160,869. Mone R. Isaacs, Chelsea, N. J.

Improved lubricant, comprising mineral lubricating oil and 0.05-10.00% of an organic carbamic acid derivative. No. 2,160,880. Clarence M. Loane, Whiting, and Bernard Shoemaker, Hammond, Ind., to Standard Oil Co., Chicago, Ill.

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Motor lubricating oil having no corrosive action on cadmium-silver, cadmium-nickel, and copper-lead bearing alloys; lubricant comprises hydrocarbon oil containing an organic ester of selenic acid. No. 2,160,881. Clarence M. Loane and Bernard H. Shoemaker, Hammond, Ind., to Standard Oil Co., Chicago, Ill.

Flushing oil, comprising kerosene or gas oil and 0.01-10.00% metallo-organic compound capable of reducing the cone deposit of the oil subsequently used in the engine. No. 2,160,911. Robert P. Russell, Elizabeth, N. J., to Standard Oil Development Co., a corp. of Delaware.

Extreme-pressure lubricant, comprising a hydrocarbon oil and a small amount of a cyclo-polymethylene compound having within the ring a phosphorous atom and one of oxygen. No. 2,160,915. William Schreiber, to The Atlantic Refining Co., both of Philadelphia, Pa.

Lubricating oil non-corrosive to hard bearing alloys of the type cadmium-silver, cadmium-nickel, and copper-lead, comprising normally corrosive oil containing an organic ester of boric acid. No. 2,160,917. Bernard H. Shoemaker and Clarence M. Loane, Hammond, Ind., to Standard Oil Co., Chicago, Ill.

Herbicidal oil, comprising a liquid mixture of aromatic and unsaturated compounds having an aniline point of about 20-80 deg. F. and gravity 8-20 deg. A. P. I., obtained by hydrogenating a petroleum oil. No. 2,160,929. James Prince Warner and Alexis Voorhies, Jr., Baton Rouge, La., to Standard Oil Development Co., of Delaware.

Motor lubricant containing a beta-diketone compound of platinum, palladium, or nickel, preventing the formation of hard carbon deposits in the engine. No. 2,161,184. Leo J. McKone and Willard E. Lyons, to Leo Corporation, all of Chicago, Ill.

Cheese product, comprising cheese plasticized with a pre-boiled mixture of a fatty oil and soya flour admixed therewith in the presence of water containing a small amount of caustic potash as emulsifier. No. 2,161,401. Charles Doering and W. Kedzie Teller, to Henry H. Doering, all of Chicago, Ill.

Horticultural spray powder, containing 92% thio-diphenylamine, 1% tech. dodecanol, 5% celite, 1% each of tricalcium phosphate and a sulfonated condensation product of naphthalene and formaldehyde. No. 2,161,462. Albert L. Flenner, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Suede leather cleansing material, comprising small bits of soft, resilient material consisting essentially of vulcanized oils, said bits having a surface to which particles of dust or the like will adhere. No. 2,161,504. Clinton London Campbell, Noroton Heights, Conn., to The Viscol Company, Stamford, Conn.

Heavy-duty lubricating oil, comprising mineral lubricating oil containing a small amount of oil-miscible, substantially water-insoluble dialkyl xanthyl ethyl ether. No. 2,161,584. Robert C. Moran, Wenonah, and Everett W. Fuller, Woodbury, N. J., to Socony-Vacuum Oil Co., Inc., New York City.

Heavy-duty lubricating oil stabilized against oxidation by the addition thereto of a small amount of dialkyl, or diaralkyl, xanthyl ethyl ether. No. 2,161,585. Robert C. Moran, Wenonah, and Everett W. Fuller, Woodbury, N. J., to Socony-Vacuum Oil Co., Inc., New York City.

Rubber vulcanizing agent, comprising an organic thio-urea derivative. No. 2,161,754. George W. Watt, Akron, Ohio, to Wingfoot Corp., Wilmington, Del.

Coal Tar Chemicals

Preparation X, Y- amino-alkyl- alpha-R cinnamates, where R, X, and Y represent alkyls, one of which has at least 4 carbon atoms. No. 2,158,239. William A. Lott, East Orange, N. J., to E. R. Squibb & Sons, New York City.

Preparation condensation products of the perylene series. No. 2,158,296. Heinrich Neresheimer and Anton Vilsmeier, Ludwigshafen-on-the-Rhine, Germany, to General Aniline Works, Inc., New York City.

Preparation para-alkyl benzaldehyde, by treating benzene with carbon monoxide and an alkyl compound simultaneously, in the presence of aluminum chloride. Nos. 2,158,518-9. Walter Christian Meuly, New Brunswick, N. J., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Preparation nitro derivatives of para-alkyl sulfoxides of diphenylamines. No. 2,158,648. Werner Zerweck and Heinrich Ritter, Frankfort-on-the-Main-Fechenheim, Germany, to General Aniline Works, Inc., New York City.

Preparation arylamino derivatives of 2,4-dinitro-phenol. No. 2,158,956. Edgar C. Britton, Frank B. Smith, John E. Livak, and Winfield W. Sunderland, to the Dow Chemical Company, all of Midland, Mich.

Preparation hydroxy-alkyl ethers of substituted phenols. No. 2,158,957. Gerald H. Coleman and John W. Zemba, to The Dow Chemical Company, all of Midland, Mich.

Preparation hydroxy-alkyl ethers of 4-tert-alkyl phenols. No. 2,158,958. Gerald H. Coleman and John W. Zemba, to The Dow Chemical Company, all of Midland, Mich.

Preparation hydroxy-alkyl ethers of tertiary-alkyl phenols. No. 2,158,159. Gerald H. Coleman and John W. Zemba, to The Dow Chemical Co., all of Midland, Mich.

Preparation of hydroxy-alkyl ethers. No. 2,158,960. Gerald H. Coleman and John W. Zemba, to The Dow Chemical Co., all of Midland, Mich.

Preparation of nuclear alkylated anilines. No. 2,159,370. Robert R. Dreisbach, to The Dow Chemical Co., both of Midland, Mich.

Preparation monoarylides of some aromatic dicarboxylic acid halides. No. 2,159,605. Willy Schumacher and Paul Helmke, Frankfort-on-the-Main, Germany, to General Aniline Works, Inc., New York City.

Method preparing N-nitroaryl polyhydroxy alkyl-amino compounds. No. 2,159,804. Walter Eastby Lawson and Charles Philip Spaeth, Woodbury, N. J., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Polyiodo-derivatives of aryl acylamino acids. No. 2,160,413. Max Dohrn, Berlin-Charlottenburg, and Paul Diedrich, Finkenkrug, Germany, to Schering Aktiengesellschaft, a corp. of Germany.

Production copper phthalocyanines by heating metallic copper with an ortho-arylene-dicyanide. No. 2,160,837. Stanley R. Detrick, Gordon Heights, to E. I. du Pont de Nemours & Co., Wilmington, Del.

Preparation detergent and wetting agents comprising alkyl-substituted aromatic sulfonic acids. Nos. 2,161,173-4. Lucas P. Kyrides, Webster Groves, Mo., to Monsanto Chemical Co., St. Louis, Mo.

Preparation of dihydrobenzocarbazoles. No. 2,161,524. Heinrich Morschel, Cologne-Deutz, and Otto Goll, Leverkusen-I. G. Werk, Germany, to General Aniline Works, Inc., New York City.

Nitroalkyl esters of phthalic acid. No. 2,161,552. Byron M. Vanderbilt, to Commercial Solvents Corp., both of Terre Haute, Ind.

Preparation alkyl ethers of tert-alkyl phenyl phenols. No. 2,161,558. Gerald H. Coleman and Garnett V. Moore, to The Dow Chemical Co., all of Midland, Mich.

Hydroxybenzocarbazole compounds. No. 2,161,697. Willy Broeg, Leverkusen-I. G. Werk and Heinrich Morschel, Cologne Deutz, Germany, to General Aniline Works, Inc., New York City.

Coatings

Vinyl resin coating for articles of iron, tin-plate or zinc; priming coat consists of polyvinyl partial acetate resin acetalized with a low M. W. alkanal, and finishing coat of joint polymerizate of vinyl chloride with vinyl acetate, both coats are baked at above 275 deg. F. No. 2,158,111. Arthur K. Doolittle, South Charleston, W. Va., to Carbide and Carbon Chemicals Corp., a corp. of New York.

Vinyl resin coating for iron and tin plate, comprising a conjoint polymerizate of vinyl chloride and acetate together with a stabilizer material from the group consisting of acid phosphates and sulfides. No. 2,160,061. Arthur K. Doolittle, South Charleston, W. Va., to Carbide and Carbon Chemicals Corp., of New York.

Coating material resistant to mixed hydrocarbon fuel materials, comprising a polymer of vinyl formate. No. 2,160,372. Hermann Stark, Bad Soden, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Method decorating ceramic products, in which the chemically cleaned surface is coated with film of viscous resin dissolved in a volatile solvent containing an essential oil, then spraying film with solid-phase-dispersion liquid not freely miscible therewith, and firing the product. No. 2,160,560. Frank Dean Parkinson, Blackpool, England.

Coating composition having slow-drying characteristics, comprising essentially a mixture of nitro-cellulose and a conjoint vinyl chloride, vinyl acetate polymer; resinous ingredients are dissolved and mixed with a glycol dialkyl ether. No. 2,161,025. Arthur K. Doolittle, South Charleston, W. Va., to Carbide and Carbon Chemicals Corp., of New York.

Fatty coating composition suitable for coating meat and other food products, comprising gelatin and water in the proportion 1/3, and a fatty material solidifying at atmospheric temperature; ingredients are homogeneously combined, having a consistency approximating that of egg white of a hard-boiled egg; proportion of gelatin solution is 4/3. No. 2,161,029. Henry Carl Eckrich and Herman J. Eckrich, Sr., Fort Wayne, Ind., to Peter Eckrich & Sons, Inc., Kalamazoo, Mich.

Metal-metal oxide coating, comprising the application to a surface a mixture of zinc dust with solution of inorganic salts in such proportion as to be capable of reacting with the zinc and oxygen (from air) to form a film of metal particles bonded to particles of metal oxygen compounds (derived from the salts), the whole of which forming a coating of impervious grain size. No. 2,161,104. George S. Smith, Oakland, Calif.

Coating composition having consistency of oil paint formulas, comprising aqueous phosphoric acid (sp. gr. 1.2-1.3) and a pigment-type oxide of a metal which sets and hardens with the acid; also added is a reversible colloidal aluminum hydroxide material. No. 2,161,290. Hans Georg Grimm, Heidelberg, and Friedrich Schamberger, Ludwigshafen-on-the-Rhine, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Dip-soldering process for metal articles, comprising floating molten layer of zinc chloride and stannous chloride on the molten metal bath; layer of salts serves to prevent oxidation of the bath and to strip the dipped article of excess solder while tin-coating the remaining solder on the article. No. 2,161,556. Walter P. Carroll, Cicero, and Dimitrie S. Kondrat, Chicago, Ill., to National Lead Co., New York City.

Method forming a protective coating on aluminum metal, comprising essentially the formation of an anodic oxide film impregnated with a dense mass of silica firmly united thereto. No. 2,161,636. William K. Rankin, Lansdowne, and Jacob R. Brossman, Yeadon, Pa., to General Electric Co., of New York.

Manufacture molding material applicable to fibrous material as a flux and coating, comprising heating a lignin material with moisture as a modifying agent to reduce the melting-point of the lignin material to a plastic state at normal temperatures. No. 2,161,748. Nicholas N. T. Samaras and Mark Plunguian, Dayton, Ohio, to The Mead Corporation, Chillicothe, Ohio.

Manufacture molding material applicable to fibrous material as a flux and coating, comprising the heating of a lignin material with furfural as modifying agent, to effect a substantial reduction in the melting point of the lignin material. No. 2,161,749. Nicholas N. T. Samaras, Dayton, and Mark Plunguian, Chillicothe, Ohio, to The Mead Corp., Chillicothe, Ohio.

Dyes, Stains, etc.

Mono-azo dyestuffs having for a base a derivative of a sulfonic acid of naphthol or of pyrazolone; derivatives not to be long-chain alkyls, as other azo-coupled component has an alkyl substituent of 10-20 carbon atoms. No. 2,158,283. Norman Hulton Haddock and Colin Henry Lumsden, Blackley, Manchester, Eng., to Imperial Chemical Industries, Ltd., a corp. of Great Britain.

Preparation a polymethine dyestuff having numerous alkylenic linkages and other unsaturated groups. No. 2,158,287. Walter Konig, Dresden, Germany, to Agfa Ansco Corp., Binghamton, N. Y.

A direct dyestuff, having a conjugated system of alternate phenyl and naphthyl azo and amido components. No. 2,158,306. Swanie S. Rossander, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Mono-azo-dyestuffs, of structure essentially that of an azophenyl-phenyl ether. No. 2,158,407. Achille Conzetti, Basel, Switzerland, to J. R. Geigy S. A., Basel, Switzerland.

Preparation acid anthraquinone dyestuffs. No. 2,158,473. Carl Mettler, to J. R. Geigy, S. A., both of Basel, Switzerland.

Preparation azo dyestuffs yielding blue shades on vegetable fibers, after fixing with copper. No. 2,158,843. Carl Taube and Otto Bayer, Leverkusen, I. G. Werk, Germany, to General Aniline Works, Inc., New York City.

Water-soluble dyestuffs from salts of acid sulfuric acid esters prepared from leuco-form vat dyes having an alkylene oxide-triethanolamine-condensate structure; dyes are stable, dark-colored oil readily soluble. No. 2,159,195. Ludwig Zeb, Leverkusen-Wiesdorf, and Claus Heuck, Leverkusen-I. G.-Werk, Germany, to Durand & Huguenin Aktiengesellschaft, Basel, Switzerland.

Preparation anthraquinone dyestuffs capable of being chromed. No. 2,159,506. Georg Kranzlein, Hans Schlichenmaier, and Theodor Meissner, Frankfort-on-the-Main, Germany, to General Aniline Works, Inc., New York City.

Manufacture azo dyestuffs. No. 2,159,542. Carl Apotheker and Max Hartmann, Riehen, and Emil Merz, Binningen, Switzerland, to Society of Chemical Industry in Basle, Basel, Switzerland.

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Preparation of leuco-indigo. No. 2,159,930. Newton Lamb, Saginaw, Mich. to The Dow Chemical Co., Midland, Mich.

Polyazo dyestuffs fixable with copper. No. 2,160,448. Walter Wehrli, to Chemical Works, formerly Sandoz, both of Basel, Switzerland.

Wood stain and filler composition, comprising a water-soluble aniline dye, a volatile organic solvent therefor, a rapidly volatilizing component in which the dye is insoluble, a wood filler ingredient, a resin, and a lubricating lactate ester. No. 2,161,503. Edward R. Bush, Lemont, Ill., to Chadeloid Chemical Co., New York City.

Manufacture some water-insoluble heterocyclic azo dyestuffs, yielding blue to black shades of good light fastness. No. 2,161,622. Josef Haller, Leverkusen-I. G. Werk, Germany, to General Aniline Works, Inc., New York City.

Heterocyclic azo dyestuffs from a hydronaphthol. No. 2,161,627. Arthur Howard Knight, Blackley, Manchester, England, to Imperial Chemical Industries, Limited, of Great Britain.

Preparation a water-insoluble dyestuff intermediate. No. 2,161,628. Herman W. Mathieu and Swanie S. Rossander, to E. I. du Pont de Nemours & Co., all of Wilmington, Del.

Preparation a polyazo dyestuff. No. 2,161,638. Swanie S. Rossander, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Explosives

Method manufacturing colloided, double base smokeless powder, in which nitro-cellulose is colloided at ordinary temperatures by a mixture consisting of anhydrous solvents for the nitro-cellulose. No. 2,159,208. Ellsworth S. Goodyear, Kenvil, N. J., to Hercules Powder Co., Wilmington, Del.

Non-detonating gas-producing composition, comprising ammonium nitrate, a carbonaceous substance combining exothermically with oxygen, and about 1% of the group consisting of alkali metal chromates, chromic oxide, alkali metal polychromates and the like. No. 2,159,234. James Taylor, Ayrshire, Scotland, to Imperial Chemical Industries, Ltd., a corp. of Great Britain.

High explosive, comprising liquid explosive nitric ester gelatinized in nitrocellulose and having also therein a derivatized acid amide. No. 2,159,973. Walter Eastby Lawson, Woodbury, N. J., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Ammunition priming material comprising an admixture with inexplosive ingredients of lead nitrato-hypophosphite. No. 2,160,469. Willi Brun and James E. Burna, Bridgeport, Conn., to Remington Arms Co., Inc., a corp. of Delaware.

Propellent powder grain composed of a solidified droplet of gelatinized smokeless powder base having a gravimetric density in excess of 0.500. No. 2,160,626. Harold F. Schaefer, Alton, Ill., to Western Cartridge Co., East Alton, Ill.

Fine Chemicals

Method for production a colored sound film. No. 21,099. Reissue. Bela Gaspar, Brussels, Belgium.

Stabilized, substantially tasteless salt composition, containing an alkaline earth salt of acetyl salicylic acid and 1-2% ammonium chloride, said composition being substantially anhydrous. No. 2,158,091. Joseph R. Stevens, to Merck & Co., Inc., both of Rahway, N. J.

Production allantoin by reaction urea with a disubstituted acetic acid. No. 2,158,098. Carl N. Zellner and Joseph R. Stevens, to Merck & Co., all of Rahway, N. J.

Photographic film element. No. 2,158,173. Ernest L. Baxter, to Eastman Kodak Co., both of Rochester, N. Y.

Process toning and intensifying developed silver images on photographic film, employing a single aqueous solution containing one of the group, quinone mono-, di-, and tetra-thiosulfuric acids. Nos. 2,158,184 and 2,158,186. Kenneth C. D. Hickman and John C. Hecker, Rochester, N. Y., to Eastman Kodak Co., Jersey City, N. J.

Process toning and intensifying developed silver images on photographic film, employing a single aqueous solution of a substituted quinone thiosulfuric acid. No. 2,158,185. Kenneth C. D. Hickman and John C. Hecker, to Eastman Kodak Co., all of Rochester, N. Y.

Fog inhibitor for photographic emulsions, a compound having for the nuclear group one of the type, sulfur, oxygen, and polymethylene, combining two phenyl radicals having auxochromic substituents in the 2,4,5 positions. No. 2,158,204. Samuel E. Sheppard and Waldemar Vanselow, to Eastman Kodak Co., all of Rochester, N. Y.

Method preparing photographic emulsion, wherein only part of the water and gelatin is incorporated with the silver halide, which mixture is hardened with an appropriate agent before adding balance of the diluents. No. 2,158,219. Bruno Claus, Halle-on-the-Saale, Germany.

Stabilization of protein matter subject to enzyme proteolysis, with addition of small quantity iodine halogenide. No. 2,158,411. Leonard Elion, Scheveningen, Netherlands.

Prolamine composition, constituted of prolamine base, protein fixing agent for said base, and a salt of an amino-alkanol as a blushing inhibitor. No. 2,158,481. Donald W. Hansen and Paul R. Shildneck, Decatur, Ill., to Prolamine Products, Inc., Dover, Del.

Preparation an aliphatic amine salt of alginic acid. No. 2,158,485. Bennett Preble, San Diego, Calif., to Kelco Co., Los Angeles, Calif.

Preparation an amine alginate, consisting of a mixture of inorganic substances and ethanolamine. No. 2,158,486. Bennett Preble, National City, Calif., to Kelco Company, Los Angeles, Calif.

Preparation amine alginates, from alginic acid and propanolamine, ethanolamine, and butanolamine. No. 2,158,487. Bennett Preble, National City, Calif., to Kelco Company, Los Angeles Calif.

Preparation decomposition products of scleroproteins. No. 2,158,499. Wolfgang Grassmann, Dresden, and Hans Reich, Berlin, Germany.

Per-oxidation inhibitor for organic compounds consisting of an epsilon-enol-tautomer of one of a number of unsaturated keto-acids having at least 6 carbon atoms. No. 2,158,724. Lowell B. Kilgore, Washington, D. C., to Kilgore Development Corp., Washington, D. C.

Preparation an oestrus-promoting substance from the anterior lobe of the hypophysis. No. 2,158,788. Willy Ludwig, Frankfort-on-the-Main-Hochst, Germany, to Winthrop Chemical Co., Inc., New York City.

Manufacture purified mercaptothiazoles. No. 2,161,741. John R. Gage, Akron, Ohio, to Wingfoot Corporation, Wilmington, Del.

Glass

Production vitreous enameling stock. No. 2,158,443. Gordon L. von Planck, San Francisco, Calif.

Process and apparatus for manufacturing safety glass. No. 2,159,630. Elmer H. Haux, Tarentum, and Earl L. Fix, New Kensington, Pa., to Pittsburgh Plate Glass Co., a corp. of Pennsylvania.

Industrial Chemicals

Production electricity from a fuel cell; comprising oxidizing a fuel gas at the gas electrode of a gas cell, by means of a carbonate contained in a molten mixture of alkali carbonates, chlorides, and fluorides, the melting-point of the mixture being below 700 deg. C.; oxygen gas is simultaneously reduced by reaction with positively-charged ions at oxygen electrode of the cell. No. 21,100. Reissue. Herbert H. Greger, Washington, D. C., to board of trustees composed of C. F. Hirshfeld, Detroit, Mich., F. G. Cottrell, Washington, D. C., and R. J. Gaudy, Chicago, Ill.

Sedimentation apparatus. No. 21,109. Reissue. William W. Sayers, Chicago, Ill., and Richard F. Bergmann, Cleveland, Ohio, and Harold F. Watson, Philadelphia, Pa., to Link-Belt Co., Chicago, Ill.

Preparation photographic emulsion, by dissolving a cellulose ester in an appropriate solvent, introducing into this solution an alkaline agent, and sensitizing the partially decomposed ester with silver halide. No. 2,158,825. Friedrich Lierg, one-half to Oskar Czeija, both of Vienna, Germany.

A light-sensitive diazotype layer, comprising the mono-diazo compound of a para-diamino-diphenyl, carrying in the nucleus containing the diazo group, 2 alkoxy groups in the 2-and 5-positions. No. 2,158,836. Maximilian Paul Schmidt and Georg Werner, to Kalle & Co., Aktiengesellschaft, both of Wiesbaden-Biebrich, Germany.

A supersensitive photographic emulsion, containing a carbocyanine dyestuff. Nos. 2,158,882-3. Charles E. K. Mees, to Eastman Kodak Co., both of Rochester, N. Y.

Photographic silver halide emulsion containing a supersensitizing mixture of carbocyanine dyes. Nos. 2,159,037-8. Charles E. K. Mees, to Eastman Kodak Company, both of Rochester, N. Y.

Manufacture of l-ascorbic acid. No. 2,159,191. Wilhelm Wenner, Basel, Switzerland, to Hoffmann-La Roche, Inc., Nutley, N. J.

Preparation of a double salt from calcium ascorbate and calcium acetyl-salicylate. No. 2,159,214. Samuel Klein, Newark, N. J.

Reversal process for developing photographic emulsions, wherein is interposed between the 2 developments a treatment in a bath containing a thiourea capable of forming silver nuclei within the emulsion. No. 2,159,466. Gustav Wilmanns, Wolfen, Kreis Bitterfeld, Wilhelm Schneider, Dessau, and Richard Kethur, Bitterfeld, Germany, to Agfa Ansco Corp., Binghamton, N. Y.

Photographic silver halide emulsion, containing a supersensitizing oxaselenazolocarbocyanine dye. No. 2,159,565. Charles E. K. Mees, to Eastman Kodak Co., both of Rochester, N. Y.

Oxidation inhibitor for aqueous oil emulsions, comprising ascorbic acid derivatives, reductone, or dihydroxy-maleic acid. No. 2,159,986. Philip P. Gray, Forest Hills, and Irwin Stone, New York City, to Wallerstein Co., Inc., New York City.

Non-caking sodium perborate, containing a small amount of magnesium benzoate. No. 2,159,999. Joseph S. Reichert and Howard L. Potter, Niagara Falls, N. Y., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Preparation hexadecylamines. No. 2,160,058. Lloyd W. Covert, to Rohm & Haas, both of Philadelphia, Pa.

Blood-stanching compound, consisting of a vinyl compound capable of swelling in water. No. 2,160,503. Willy O. Hermann, Deisenhofen, Germany, to Chemische Forschungsgesellschaft, m.b. H., Munich, Germany.

Preparation partially esterified dihydroesterin compounds. No. 2,160,555. Karl Miescher, Riehen, and Caesar Scholz, to Society of Chemical Industry in Basle, all of Basel, Switzerland.

Preparation of saccharosonic acids and their salts. No. 2,160,621. Heinz Ohle, Hohen Neuendorf, near Berlin, Germany.

Preparation pregnanolones from pregnandiols. No. 2,160,719. Adolf Butenandt, Danzig-Langfuhr, Free City of Danzig, to Schering Aktiengesellschaft, a corp. of Germany.

Preparation a soluble double salt of theophylline and a mono-amino polyhydric alcohol. No. 2,161,114. Ernest H. Volwiler, Highland Park, and Edmond E. Moore, Waukegan, Ill., to Abbott Laboratories, North Chicago, Ill.

Preparation substituted barbituric acids having quaternary carbon atoms. No. 2,161,212. Frank C. Whitmore, State College, Pa. and Melvin A. Thorpe, St. Louis, Mo., to Mallinckrodt Chemical Works, St. Louis, Mo.

Preparation substituted malonic esters. No. 2,161,213. Frank C. Whitmore, State College, David M. Jones, Forty Fort, and Clarence I. Noll, State College, Pa., to Mallinckrodt Chemical Works, St. Louis, Mo.

Preparation merocyanine dyestuffs. No. 2,161,331. Leslie G. S. Brooker and Russell H. Van Dyke, Rochester, N. Y., to Eastman Kodak Co., Jersey City, N. J.

Preparation of a 3,3'-dialkylthiazolino-tricarbocyanine salt, as a dyestuff. No. 2,161,332. Leslie G. S. Brooker, Rochester, N. Y., to Eastman Kodak Co., Jersey City, N. J.

Preparation of 1,1'-dialkylbenzseleno-pseudocyanine salt, as a dyestuff. No. 2,161,339. Walter Dieterle, Dessau-Ziebigk in Anhalt, and Robert Walter, Wolfen, Kreis Bitterfeld, Germany, and Hermann Durr, Binghamton, N. Y., to Agfa Ansco Corporation, Binghamton, N. Y.

Transparent photographic element comprising a superficial antihalation coating of a dicarboxylic acid ester of agar. No. 2,161,364. Carl J. Malm and John Emerson, Rochester, N. Y., to Eastman Kodak Company, Rochester, N. Y.

Preparation of polynuclear cyclic ketones. No. 2,161,389. Leopold Buzicka, Zurich, Switzerland, to Society of Chemical Industry in Basle, Basel, Switzerland.

Vat dyestuffs of the 2-naphthalene-2'-indolinindigo series. No. 2,161,400. Werner Zerweck and Walter Brunner, Frankfort-on-the-Main-Fechenheim, Germany, to General Aniline Works, Inc., New York City.

Preparation asymmetric arseno compounds. No. 2,161,538. Karl Streitwolf, deceased, late of Frankfort-on-the-Main, by Frieda Streitwolf, Frankfort-on-the-Main, Germany, administratrix, and Alfred Fehrle, Bad Soden in Taunus, and Walter Hermann, Frankfort-on-the-Main-Hochst, Germany, to Winthrop Chemical Co., Inc., New York City.

Production monovinylacetylene, by passing acetylene through a solid catalyst comprising a cuprous salt, magnesium chloride, and an aliphatic polyhydric alcohol. No. 2,158,051. Herbert Berg and Hans Heim, Burghausen, and Franz Leiss, Munich, Germany, to Dr. Alexander Wacker, Gesellschaft fur Elektrochemische Industrie, G.m.b.H., Munich, Bavaria, Germany.

Preparation esters of glycols of the group consisting of alkylene and polyalkylene glycols, where both glycol hydroxy groups are replaced by a radical of a hydroxy-monocarboxylic acid acylated with a non-hydroxy monocarboxylic acid radical. No. 2,158,107. Thomas F. Carruthers, South Charleston and Charles M. Blair, Charleston, W. Va., to Carbide and Carbon Chemicals Corp., a corp. of New York.

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Method processing gelatin, wherein the gelatin is deaminized. No. 2,158,117. Donald P. Grettie, to Industrial Patents Corp., both of Chicago, Ill.

Manufacture strontium nitrate from the sulfate, by treating aqueous strontium sulfate with barium nitrate in the presence of about 2% of an acid capable of forming soluble barium salts. No. 2,158,162. William De Garmo Turner, to H. C. Bugbird Co., Inc., both of New York City.

Processing of oils, by addition of hydrogen peroxide and a nitrite. No. 2,158,163. Walter M. Urbain and Lloyd B. Jensen, to Industrial Patents Corp., all of Chicago, Ill.

Preparation chlorinated ethylenes from catalytic reaction of acetylene with pentachlorethane. No. 2,158,213. Georg Basel and Erich Schaeffer, Burghausen, Upper Bavaria, Germany, to Dr. Alexander Wacker, Gesellschaft fur Elektrochemische Industrie, G.m.b.H., Munich, Bavaria, Germany.

Process for concentrating calcite raw mineral containing siliceous matter, wherein a small amount of flotation agents are added to the aqueous suspension of the ore pulp; said agents comprise a free fatty acid and a substantially insoluble oil. No. 2,158,220. Arthur Crago, Mulberry, Fla., to Phosphate Recovery Corp., New York City.

Production litharge by electrolytic cell method, comprising a lead anode, an anolyte for lead salts, a diaphragm, a litharge-precipitating catholyte, and an inert cathode; concentration dissolved lead in anolyte to be held within the limits of 0.1 and 1.0%. No. 2,158,269. Reginald G. Bowman, Gary, and William J. Knox, Jr., Hammond, Ind., to Anaconda Lead Products Co., New York City.

Preparation methyl-vinyl ketone, comprising the passing into aqueous solution of vinyl-methyl ketone of an aliphatic unsaturated gaseous hydrocarbon possessing at least 3 carbon atoms, and separating the ketone and water layers. No. 2,158,290. Heinrich Lange and Otto Horn, Frankfort-on-the-Main-Hochst, Germany, to I. G. Farbenindustrie, Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Polyvinyl material, emulsifiable in water with polyvinyl alcohol, the reaction product of an aldehyde or ketone with a polyvinyl ester finely-divided in aqueous solution. No. 2,158,311. Werner Starck, Hofheim in Taunus, and Heinrich Freudenberger, Frankfort-on-the-Main-Nied, Germany, to I. G. Farbenindustrie, Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Process for the continuous extraction of oil seeds with appropriate solvents. No. 2,158,427. Joseph Reichert, Wiesbaden, Germany.

Method and apparatus for evaporating liquid oxygen. No. 2,158,458. John A. Mathis and Roland W. Milan, Pinckneyville, Ill.

Process manufacturing alkali-metal peroxides from alkali alcoholate, in the presence of an auto-oxidizable leuco-compound of the class consisting of hydrazobenzene and anthra hydroquinone; process designed for continuous flow of materials through catalytic cycle. No. 2,158,523. Georg Pfleiderer, Ludwigshafen-on-the-Rhine, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Preparation hydrogen peroxide, from an alkylated hydroquinone oxidized with oxygen. No. 2,158,525. Hans-Joachim Riedl and Georg Pfleiderer, Ludwigshafen-on-the-Rhine, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Preparation partially hydrogenated heterocyclic nitrogen compounds. No. 2,158,526. Nikolaus Roh, Ludwigshafen-on-the-Rhine, Germany, to General Aniline Works, New York City.

Improvement of wheat flour, comprising mixing with the dry milling product a powdered bromate and a powdered active organic peroxide to effect bleaching and maturing. No. 2,158,588. Frederic H. Penn, Dallas, Texas.

Improvement of wheat flour, comprising mixing with the dry milling product a powdered iodate and a powdered active organic peroxide. No. 2,158,589. Frederic H. Penn, Dallas, Texas.

Manufacture soap by saponification of liquid fatty materials with waste sulfite lye and freshly prepared caustic soda lye. No. 2,158,663. Carl Leyst-Kuchenmeister, Schlachtensee, near Berlin, Germany.

Purification citrus oils having resinous impurities. No. 2,158,670. Charles Douglas Barnes, Long Beach, and William A. S. Wright, Los Angeles, Calif., to Union Oil Co. of California, Los Angeles, Calif.

Process for the fractionation of sulfonated fatty materials. No. 2,158,680. Edmond R. P. E. Retailliau, Wood River, Ill., to Shell Development Co., San Francisco, Calif.

An apparatus for feeding counter-current extraction units. No. 2,158,782. Michele Bonotto, Evansville, Ind., to Extractol Process, Ltd., Wilmington, Del.

Thermophoric mixture, consisting of anhydrous aluminum chloride, sodium and potassium chlorides. No. 2,158,854. Leonard C. Drake, Woodbury, N. J., to Socony-Vacuum Oil Co., Inc., New York City.

A 2-chloroallyl ester of an acid from the group consisting of oxalic acid and acids having the general formula: $R—(COOH)_n$ where R is aromatic, aliphatic, or cycloaliphatic, having no ethylenic linkages, and n an integer. No. 2,159,008. Gerald H. Coleman and Bartholdt C. Hadler, to The Dow Chemical Co., all of Midland, Mich.

Electrolytic method for processing raw sugar juices. No. 2,159,074. Robert E. Briggs, Rocky Ford, Colo.

Process for catalytic conversion of mixtures of carbon monoxide and hydrogen into hydrocarbons and their oxygen derivatives. No. 2,159,077. Franz Duftschmid, Heidelberg, and Eduard Linckh and Fritz Winkler, Ludwigshafen-on-the-Rhine, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Process for separation of acetic anhydride from its admixtures with water and acetic acid, comprising the addition of a lower alkyl acetate of boiling-point below that of the acid and anhydride, such that an azeotropic mixture of water and acetate is formed, removable by distillation. No. 2,159,146. Henri Martin Guinot, Melle, Deux-Sevres, France, to les Usines de Melle, Melle, Deux-Sevres, France.

Manufacture sodium citrate dihydrate. No. 2,159,155. Homer H. Holton, Corona, Calif., to California Fruit Growers Exchange, Los Angeles, Calif.

Manufacture a granular pectin product, by heating dry dextrose hydrate until a liquid state containing crystalline nuclei is attained, and adding to this melt dry powdered pectin particles, then cooling the mixture to a dry crystalline mass. No. 2,159,194. Clarence Walter Wilson, Corona, Calif., to California Fruit Growers Exchange, Los Angeles, Calif.

Shaped nickel sinter articles, produced by sintering mixture of nickel powder (from nickel carbonyl) having particles of average size not over 10 mu, and a metal or metals from the group consisting of iron, chromium, copper, and manganese, whose particle size is not over 100 mu. No. 2,159,231. Leo Schlecht, Ludwigshafen-on-the-Rhine, and Walter Schubardt, Mannheim, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Disabling gas composition, a crotonaldehyde solution of a normally solid, irritant halogenated acetophenone. No. 2,159,241. Duncan B. Williams, Glen Ridge, N. J., to Union Carbide and Carbon Corp., a corp. of New York.

Method and apparatus for hydrogenating sulfur-containing carbonaceous materials. No. 2,159,281. Paul Marecaux, Nancy, France.

Continuous process converting saponifiable fats into soap and glycerine. No. 2,159,397. Victor Mills, to The Procter & Gamble Co., both of Cincinnati, Ohio.

Method separating hydrocarbon gases, wherein a desired concentrate of gases is obtained by selective diffusion through a non-porous diaphragm; gases diffusing through diaphragm are swept out by a gas relatively insoluble in said diaphragm, to maintain a favorable partial pressure. No. 2,159,434. Frederick E. Frey, Bartlesville, Okla., to Phillips Petroleum Co. of Delaware.

Method producing aldehydes and alcohols by the isomerization of 1,2-alkylene oxide having 2 to 4 carbon atoms, in the presence of a catalyst, usually an alum, and a small proportion of an oxidation catalyst. No. 2,159,511. Mathias Pier, Heidelberg, and Walter Simon, and Paul Jacob, Ludwigshafen-on-the-Rhine, Germany, to Standard-I. G. Co., Linden, N. J.

Catalytic method for oxidizing nitrosyl chloride to nitric oxide and chlorine, and for converting nitric oxide to the peroxide; catalytic material comprises an aluminum zeolite. No. 2,159,528. William C. Klingelhoefer, Jr., Syracuse, N. Y., to The Solvay Process Co., New York City.

Preparation of delta-4,5-unsaturated 3-hydroxy compounds. No. 2,159,569. Leopold Ruzicka, Zurich, Switzerland, to Society of Chemical Industry in Basle, Basel, Switzerland.

Process for batch distillation of mixtures of liquid volatiles. No. 2,159,621. Willem Johannes Dominicus van Dijck, The Hague, Netherlands, to Shell Development Co., San Francisco, Calif.

Preparation a starch-liquefying enzymic material from soy bean meal. No. 2,159,678. Alfred Schultz and Lawrence Atkin, New York, and Charles N. Frey, Scarsdale, N. Y., to Standard Brands, Inc., New York City.

Production unsaturated fatty acids from the corresponding alcohols and esters. No. 2,159,700. Karl Hennig, Rosslau in Anhalt, Germany, to Deutsche Hydrierwerke Aktiengesellschaft, Berlin-Charlottenburg, Germany.

Apparatus for preparing and separating anhydrous sodium sulfate. No. 2,159,759. Henry W. Doennecke and Emory W. Douglass, Tulsa, Okla., and Carl O. Anderson, Baxter Springs, Kans., to Ozark Chemical Co., Tulsa, Okla.

Manufacture of sodium aluminate. No. 2,159,843. Richard Lloyd Davies, to Pennsylvania Salt Manufacturing Co., both of Philadelphia, Pa.

Manufacture of copper acetoarsenite (Scweinfurt Green). No. 2,159,864. Marcel Serciron, Dourdan, France.

Preparation stable mineral oil solutions of sulfur. No. 2,159,908. Edward A. Nill, Highland Park, Mich.

Method of preventing water seepage around dams, in which holes are drilled to suitable depth at desired locations and filled with a highly viscous gel of bentonite (5-15%) in water, injected under pressure. No. 2,159,954. Ben F. Powell, Custer, S. Dakota, dedicated to the free use of the People of the United States.

Preparation of some oxides of amino acids. No. 2,159,967. Max Engelmann, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Recovery of lower aliphatic acids from their admixture with acid sludges containing hydrocarbon materials. No. 2,159,984. Webster E. Fisher, Rochester, N. Y., to Eastman Kodak Co., Jersey City, N. J.

Production stable, true solutions in alcohol of sulfur and sulfides of arsenic, antimony, and lead. No. 2,160,030. Paul Nitsche, Dresden, Germany.

Cyclic process for manufacture formaldehyde from methyl formate. No. 2,160,064. James F. Eversole, Charleston, W. Va., to Carbide and Carbon Chemicals Corp., of New York.

Process for manufacture gaseous products from liquid air. No. 2,160,077. Guido Maiuri, London, England.

Apparatus for continuous treatment of chemical materials. No. 2,160,177. Royal L. Shuman, Newark, N. J., to Celluloid Corp., of New Jersey.

Manufacture finely-divided, anhydrous monocalcium phosphate substantially free of pyrophosphate. No. 2,160,232. Julian R. Schlaeger, Chicago Heights, Ill., to Victor Chemical Works, a corp. of Illinois.

Process for dry distillation of vegetable organic materials. No. 2,160,341. Theophil Reichert, Brilonwald, Germany, to Deutsche Gold-und Silber Scheideanstalt, vorm. Roessler, Frankfort-on-the-Main, Germany.

Preparation of mixture of tetra-isobutane sulfates and tetra-isobutane hydroxysulfonates. No. 2,160,343. John Ross, New York City, to Colgate-Palmolive-Peet Co., Jersey City, N. J.

Manufacture hose or tubing having outer covering of permeable fabric and inner flexible lining of a polyvinyl alcohol base material. No. 2,160,371. Ernst Schnabel, Berlin-Lichterfelde, Germany, to Resistoflex Corp., New York City.

Manufacture molded fuel briquets from divided solid, natural carboniferous materials. No. 2,160,442. Gaston Oscar Frederic Piou De Saint-Gilles and Jean Guillaume Yves Saget, Paris, France.

Apparatus for continuous crystallization of solutions by evaporating or cooling. No. 2,160,533. Richard Bonath, Bussum, Netherlands, to Werkspoor N. V., Amsterdam, Netherlands.

Manufacture carbon tetrachloride, comprising the chlorination at 400-700 deg. C. of saturated and unsaturated ethanes and propanes, in the presence of a body having a large surface. No. 2,160,574. Bruno Hennig, Bitterfeld, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Preparation anhydrous boron fluoride by reaction orthoboric acid with hydrofluoric acid, separating the desired product by distilling at least 2 different pressure stages. No. 2,160,576. Donald J. Loder, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Production aliphatic amines containing more than 6 carbon atoms. No. 2,160,578. Willi Schmidt, Ludwigshafen-on-the-Rhine, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Process preserving eggs, comprising quick-chilling of same in weak caustic soda preliminary to cold storage. No. 2,160,604. Howard H. Stamper, to F. M. Stamper Co., both of Moberly, Mo.

Cold-laid asphalt mixture, comprising heating and mixing rock asphalt containing added non-bituminous mineral aggregate, with emulsified flux, water and bituminous cement. No. 2,160,833. Joseph H. Conzelman, to Alabama Asphaltic Limestone Co., both of Birmingham, Ala.

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Thermal dehydration of aliphatic acids over a catalyst comprising a completely-amidated oxygen acid of phosphorous. Nos. 2,160,840-41. Henry Dreyfus, London, England.

Thermal dehydration of aliphatic acids over a catalyst comprising partially-amidated oxygen acids of phosphorous and their esters. No. 2,160,842. Henry Dreyfus, London, England.

Production isopropyl ether from olefins. No. 2,160,854. Edwin R. Gilliland, Cambridge, Mass., to Standard Alcohol Co., of Delaware.

Method treating marine and animal oils to increase their iodine numbers and drying oil characteristics, comprising treatment with aqueous permanganate in the absence of mineral acid. No. 2,160,861. William Hassard, Vancouver, British Columbia, Canada, to David B. Boyd, Los Angeles, Calif.

Manufacture thiazoles by simultaneous interaction of an acid amide having at least 1 hydrogen atom in the amino group, an alpha-halogeno-oxocompound, and phosphorous penta-sulfide. No. 2,160,867. Otto Hromatka, Darmstadt, Germany, to Merck & Co., Inc., Rahway, N. J.

Refractory mix capable of being baked or fired into a shaped article, consisting of a sillimanite and an alkali silicate of 36-41 Be. No. 2,160,873. Hans Kerla, Baltimore, Md.

Method freeing air or other gases from condensed vapor particles, comprising burning a hydrocarbon mixture containing chlorine, and causing combustion products to be introduced into vapor-containing atmosphere. No. 2,160,900. Clellan Ross Pleasants, San Francisco, Calif.

Manufacture a hard porous, silica insulator. No. 2,161,186. John D. Morgan, South Orange, N. J. and Russell E. Lowe, New York City, to Power Patents Co., Hillside, N. J.

Preparation a monohydric acetylenic alcohol. No. 2,161,191. Granville A. Perkins, Charleston, W. Va., to Carbide and Carbon Chemicals Corp., of New York.

Processing of marmalade fruit pieces, comprising dessication of the fruit juice with added anhydrous dextrose, thereby forming a thick, plastic body, and inserting the pieces of fruit that have been impregnated with glycerine. No. 2,161,238. James H. Stanton, Vancouver, British Columbia.

Solvent regeneration of spent decolorizing adsorbent. Nos. 2,161,306-7. Albert E. Miller, Westfield, N. J., and George R. Lord, Pelham Manor, N. Y., to Sinclair Refining Co., New York City.

Preparation C-aliphatic isocyclic amines N-substituted by oxy-aliphatic radicals. No. 2,161,322. Adolf Steindorff and Gerhard Balle, Frankfort-on-the-Main, Karl Horst, Hofheim in Taunus, and Heinz Schild, Frankfort-on-the-Main, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Solid fuel for lighters, comprising fibrous combustible material impregnated with aldehydes and their homologs. No. 2,161,385. Ferdinand Ringer, Vienna, Austria.

Automatic fluid analyzer. No. 2,161,453. Arthur Henry Wilson Busby and Robie Kerr Blois, Trail, British Columbia, Canada, to The Consolidated Mining & Smelting Co. of Canada, Ltd., Montreal, Quebec, Canada.

Process for nitration of methane by vapor-phase contact of nitric acid with methane in a ferrous-metal reaction chamber. No. 2,161,475. George K. Landon, to Hercules Powder Co., both of Wilmington, Del.

Process treating raw inulin-containing materials, comprising heating the materials in the presence of moisture to hydrolyze the inulin and, by further heating, to convert the hydrolyzed inulin to melanoidin or caramel. No. 2,161,511. Eligius Freudl, Tetschen, Czechoslovakia, to Coffarom Aktiengesellschaft, Glarus, Switzerland.

Manufacture metasilicates by digestion quartz sand with boiling caustic potash and crystallizing the product at an elevated temperature. No. 2,161,515. Max Jaeger and Franz Besemann, Bitterfeld, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Catalyst for polymerization of acetylene hydrocarbons, comprising substantially anhydrous mixture of a cuprous salt and one of the group consisting of ammonia salts, aliphatic and aryl amines, and heterocyclic nitrogen bases. No. 2,161,645. Heinrich Vollmann and Bernhard Schacke, Frankfort-on-the-Main, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Separation of vapor-phase inorganic and organic acids from their admixtures with carbon dioxide in waste gaseous products. No. 2,161,663. Hans Baehr and Wilhelm Wenzel, Leuna, and Helmut Mengdehl, Huels, Westphalia, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Method for sulfonation of coal with sulfuric acids in the presence of a mercury catalyst and a member of the group consisting of boric acid and potassium bichromate. No. 2,161,710. Karl Jaeger, Bitterfeld, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Process separating and recovering sodium carbonate of high quality from complex brines containing sodium carbonate and other compounds. No. 2,161,711. Glenn A. Keep and Eric Edward Todd.

Preparation tetrahydrofurfuryl derivatives of naphthalenes. No. 2,161,745. James G. McNally and Joseph B. Dickey, to Eastman Kodak Co., all of Rochester, N. Y.

Apparatus for thermal decomposition of ammonia. No. 2,161,746. John Lindon Pearson, Norton-on-Tees, England, to Imperial Chemical Industries, Ltd., of Great Britain.

Method for preventing foaming of agitated gelatine solutions, comprising the addition to the bath of a monohydroxy aliphatic alcohol of 6-8 carbon atoms. No. 2,161,747. Maurice L. Piker and Stephen C. Pool, to Eastman Kodak Co., all of Rochester, N. Y.

Stabilizer for phenols, comprising a compound of the class consisting of thiourea and substituted thioureas. No. 2,161,772. Thomas S. Carswell, Kirkwood, Mo., to Monsanto Chemical Co., St. Louis, Mo.

Leather

Processing of untanned, or partially tanned, leather by contact with an ether of an aliphatic polyhydric alcohol, said ether having at least 6 carbon atoms. No. 2,158,627. Wolf Kritchevsky, to Ninol, Inc., both of Chicago, Ill.

Method of dyeing leather with developable azo dye, leather being pretreated with sulfamic acid after diazotization, and before addition of the coupling agent. No. 2,160,882. Herbert A. Lubs, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Extraction of tanning substances from lignin sulfonic acids, by treating same with a condensation product of a phenol or naphthol with a carbohydrate. No. 2,161,288. Rudolf Fingado and Hans Hertlein, Leverkusen, I. G. Werk, Germany, to I. G. Farbenindustrie, Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Metals and Alloys

Method cleaning hot ferrous metal sheet, wherein a stream of abrasive particles in a non-oxidizing gas is directed against the surface, passing through a closed chamber to exclude air. No. 2,158,063. Ward Holt Broadfield, Scarsdale, N. Y., to The American Foundry Equipment Co., Mishawaka, Ind.

Cast iron welding rod, containing carbon (2.75-3.15%), silicon (2.25-3.50%), manganese (0.5-1.0%), vanadium (0.05-0.50%), and at least one of the group, copper and nickel, the sum of the percentages of the latter two being between 0.25 and 1.50%. No. 2,158,105. Charles O. Burgess, Niagara Falls, N. Y., to Oxweld Acetylene Co., a corp. of W. Va.

Process for treating steel sheet or strip in a closed muffle having an atmosphere of alcohol-saturated moisture-free air. No. 2,158,278. Mendel Donchi, Newark, N. J., to Cooper & Cooper, Inc., Brooklyn, N. Y.

Production of graphite-free hard carbides, by heating the graphitic carbide with manganese at 850-900 deg. C., the manganese carbide formed being decomposed with acid. No. 2,158,520. Oskar Meyer, Bitterfeld, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Separation of precious metal materials from sand; material is poured from a spout onto a rotating drum inclined at an angle, said drum being heated at its elevated end by a perforated burner, into which the spout feeds the ore to be fused. No. 2,158,551. Charles C. Nutter, West Los Angeles, Calif.

Apparatus for casting oxygen-free copper metal. No. 2,158,625. Russell Pearce Heuer, Bryn Mawr, Pa., to The American Metal Co., Ltd., New York City.

Fine-grain steel of generally improved properties, containing carbon up to 0.6%, manganese up to 2%, silicon not over 1%, columbium in an amount between 0.02% and 0.50%, and a substantial amount of carbide of chromium and/or molybdenum. No. 2,158,651. Frederick M. Becket, New York, and Russell Franks, Niagara Falls, N. Y., to Electro Metallurgical Co., a corp. of W. Va.

Fine-grain steel of generally improved properties, comprising not over 1% carbon, not over 2% manganese, up to 1% silicon, 0.02-0.50% columbium, and nickel from 0.05% to 5.00%. No. 2,158,652. Frederick M. Becket, New York, and Russell Franks, Niagara Falls, N. Y., to Electro Metallurgical Co., a corp. of W. Va.

Manufacture magnesium metal by reduction of the oxide with calcium carbide. No. 2,158,786. Roy C. Kirk, to The Dow Chemical Co., both of Midland, Mich.

Carbon-metal binding compound for joining solid carbon shapes to metals of the class comprising molybdenum and tungsten, consisting of iron powder bound with a cementing sugar solution. Bond is fixed by heating at 1,250-1,450 deg. C. No. 2,158,845. Raymond B. Ayer, Verona, N. J., to General Electric Co., a corp. of New York.

Metal composition, a nickel (97.5-99.95%) alloy containing a small proportion of alkaline earth silicate (0.05-2.50%). No. 2,158,864. Samuel Ruben, New Rochelle, N. Y.

Welding rod, comprising a metal core and an adherent coating thereon, the latter being a solid, weld-modifying substance and a thermoplastic resin selected from the group consisting of polyvinyl halides, polyvinyl organic acid esters, polystyrene, and the like. No. 2,158,984. Arthur R. Little and Thomas H. Vaughn, Niagara Falls, N. Y., to Oxweld Acetylene Co., a corp. of W. Va.

Pickling bath for ferrous metal sheet, comprising aqueous sulfuric acid and a nitrate, and also an oxy-salt reacting in the bath to form an additional oxidizing compound. No. 2,158,992. Nelson E. Cook to Wheeling Steel Corporation, both of Wheeling, W. Va.

Method processing molten nickel-chromium alloys, comprising addition of 0.01-0.2% alkaline earth metal to the melt after deoxidation, and incorporating in the bath at least one of the group consisting of arsenic, antimony and phosphorous in very small amount. No. 2,159,048. Leonard Bessemer Pfeil, Edgbaston, Birmingham, England, to The International Nickel Co., Inc., New York City.

High speed steels, containing 0.6-1.0% carbon, 1.0-6.0% chromium, between 1.0 and 5.0% molybdenum, and 1.0-3.0% vanadium. No. 2,159,086. Eduard Houdremont and Hans Schrader, Essen, Germany, to Fried. Krupp Aktiengesellschaft, Essen-on-the-Ruhr, Germany.

Lead alloy, containing 0.01-0.10% calcium and 0.35-1.75% tin. No. 2,159,124. Jesse O. Betterton, Metuchen, Albert J. Phillips, Plainfield, and Albert A. Smith, Jr., Metuchen, N. J., to American Smelting and Refining Co., New York City.

Method freeing surfaces of phosphate coatings, comprising the application to the coated surface of molten cyanide. No. 2,159,261. Rollie P. Durham, Flint, Mich., to General Motors Corp., Detroit, Mich.

Method dressing nickel matte, comprising sintering same in presence oxygen, mixing the sintered granular product with a carbonaceous reducing agent and heating the mixture to reduce the oxide; sintered reduced product may be stored in air, without detriment to later treatment with carbon monoxide. No. 2,159,412. Albert Edward Wallis, Clydach, England, to The International Nickel Co., Inc., New York Ctiy.

A fully-austenitic alloy steel article, containing 16-25% chromium; not over 0.1% carbon; not over 1% silicon; columbium in amount at least 10 times that of carbon, but not to exceed 1.5%; 7-10% nickel, and 1.5-3.0% manganese. No. 2,159,497. Frederick M. Becket, New York, and Russell Franks, Niagara Falls, N. Y., to Electro Metallurgical Co., a corp. of West Virginia.

Manufacture sintered nickel articles. No. 2,159,604. Leo Schlecht, Ludwigshafen-on-the-Rhine, and Walter Schubardt, Mannheim, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Steel alloy resistant to violent changes in temperature and to physical shock: 4-10% chromium; 0.01-0.15% carbon; not over 0.75% silicon; 0.25-1.50% molybdenum; 0.06-2.40% columbium. No. 2,159,723. Russell Franks, Niagara Falls, N. Y., to Electro Metallurgical Co., of West Virginia.

Austenitic steel of good resistance to corrosion by saline solutions: 16-30% chromium; 7-20% nickel; 2-5% molybdenum; manganese; over 4%, and silicon not over 1%; columbium in amount at least 4 times that of carbon, but not to exceed by over 1.5% 10 times same. No. 2,159,724. Russell Franks, Niagara Falls, N. Y., to Union Carbide and Carbon Corp., of New York.

Austenitic steel resistant to corrosion by saline solutions: 16-30% chromium; 7-20% nickel; 2-5% molybdenum; 1.5-5.0% manganese; not over 0.2% carbon, and not over 1% silicon. No. 2,159,725. Russell Franks, Niagara Falls N. Y., to Electro Metallurgical Co. of West Virginia.

Silver alloy, containing from 25 to 90% nickel, and 1-30% cadmium. No. 2,159,763. Franz R. Hensel, to P. R. Mallory & Co., Inc., both of Indianapolis, Ind.

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Eutectic alloy suitable for sealing high-vacuum vessels, comprising at least one metal of the iron group and a compound composed of a metal of that group and an element from the group comprising phosphorous and arsenic. No. 2,159,805. Kurt Lenz, Berlin-Lichterfelde, and Ernst Woeckel, Berlin-Friedenau, Germany, to General Electric Co., of New York.

Eutectic alloy suitable for sealing high-vacuum vessels, comprising at least one metal of the iron group and at least one metal from the group consisting of chromium, molybdenum, and tungsten. No. 2,159,806. Kurt Lenz, Berlin-Lichterfelde, and Ernst Woeckel, Berlin-Friedenau, Germany, to General Electric Co., of New York.

Eutectic alloys suitable for sealing high-vacuum vessels, comprising at least one metal of the iron group, and a metal or metals of the series consisting of tantalum, boron, manganese, palladium, vanadium, silicon, titanium and zirconium. Nos. 2,159,807-10. Kurt Lenz, Berlin-Lichterfelde, and Ernst Woeckel, Berlin-Friedenau, Germany, to General Electric Co., of New York.

Process for recovery magnesium from molten bath of its fluoride and/or chloride. No. 2,159,878. Philipp Balz, Bitterfeld, Germany, to Magnesium Development Corp., of Delaware.

Method treating barytes ores. No. 2,159,909. Charles W. Price, Sweetwater, Tenn.

Furnace for production volatilizable metals by thermal reduction. No. 2,159,910. Hellmuth Seliger, Otto Bretschneider, Bernhard Hubald, Willy Kruger, and Georg Truglitzka, Bitterfeld, Germany, to Magnesium Development Corp., of Delaware.

Magnesium alloy containing 2-6% bismuth, 0.5-3.0% cadmium, 1-5% aluminum, 1-3.5% zinc. No. 2,159,964. Arthur Burkhardt, Berlin-Lichterfelde and Richard Knabe, Berlin-Zehlendorf, Germany, to Georg Von Giesche's Erben, Breslau, Germany.

Flux for purifying molten metal baths, comprising a lime base calcined at 2,500-3,000 deg. F. with a fluxing agent. No. 2,159,977. Isaac A. Nicholas, Pittsburgh, Pa., to The Standard Lime and Stone Co., Baltimore, Md.

Method purifying lead metal. No. 2,159,982. Nettie M. Hurd Bullock, Orlando, Fla.

Method of dressing aluminum ores by chemical means. No. 2,160,148. Istvan Hunyady, Rakospalota, Hungary.

Fluxing compound for solder bonding on steel surfaces, containing in aqueous solution 9.5 lbs. stannous chloride, 3 lbs. zinc chloride, and about 3% ammonium chloride to make a solution of about 70 deg. Bé at room temperature. No. 2,160,195. Norman J. Beno, Chicago, Ill., to Continental Can Co., Inc., New York City.

Hard, abrasion-resisting iron alloy: chromium (5-6%), boron (0.5-2.0%), carbon (1.0-1.5%), and tungsten (14-18%). Material is unworkable, and is to be cast only. No. 2,160,290. Robert W. Schlumpf, to Hughes Tool Co., both of Houston, Texas.

Method electrodepositing metal plates containing tungsten metal, comprising dissolving a tungsten compound, and a metal co-plateable therewith from the group consisting of tantalum, nickel, cobalt, and manganese, in aqueous solution containing alkali bifluoride and phosphoric acid, adding an organic acid, and electrolyzing at pH 5.0-6.2. No. 2,160,321. Harry Howard Armstrong and Arthur Burley Menefee, Beverly Hills, Calif., to Tungsten Electrodeposit Corp., Washington, D. C.

Metal treating bath, comprising a mineral acid solution and an inhibitor preventing attack on the metal itself, a small quantity of crude wood spirit oils derived from the carbonization of wood. No. 2,160,406. Jacques Edouard Julien Georges Mascre, Premery, France, to Etablissements Lambiotte Freres Premery (Nievre), France, a corp. of France.

Welding rod of iron (about 40-50%), substantial amounts of cobalt, chromium, and tungsten aggregating between 40-50%, and also small amounts of molybdenum, vanadium, and carbon. No. 2,160,423. Winston F. Stoody, Wilmington, and John R. Spence, Whittier, Calif., to Stoody Co., Whittier, Calif.

Ceramic refractory mold, composed of multi-cellular insulating refractory coated with layer of silica, alumina, and a bonding material. No. 2,160,438. George V. McCauley, to Corning Glass Works, both of Corning, N. Y.

Method decomposing beryl ores with sulfuric acid and bisulfates, there being present a small amount of fluoride, under pressure. No. 2,160,547. Gustav Jaeger, Neu-Isenburg, and Albert Wille, Frankfort-on-the-Main, Germany, to Deutsche Gold-und Silber-Scheideanstalt vormals Roessler, Frankfort-on-the-Main, Germany.

High-resistance welding electrode, comprising a sintered mixture of refractory metal, one of the group consisting of tungsten, molybdenum, and chromium, with a compound of the class comprising the carbides of metals from 4th and 5th Groups of the periodic system and the carbides of tungsten and molybdenum, and a copper alloy bonding. No. 2,160,659. Franz R. Hensel, to P. R. Mallory & Co., both of Indianapolis, Ind.

Manufacture of hard, frittered alloys from the reduction in a carburizing medium of refractory metal oxides. No. 2,160,670. Marcel Oswald, Paris, France, to General Electric Co., of New York.

Method casting aluminum and aluminum-base alloys free from pin-hole porosity, comprising de-gassing the melt by bubbling non-oxidizing gas, hydrogen-free, through the metal while in an atmosphere of air having moisture content not over 1 grain per cu. ft. No. 2,160,812. John Herbert Alden and Philip Trimble Stroup, New Kensington, Pa., and Pasqual Michael Budge, Fairfield, Conn., to Aluminum Co. of America, Pittsburgh, Pa.

Apparatus for dry separation of precious metals from finely-divided materials. No. 2,160,822. Leroy E. Bigelow, Glendale, Calif.

Manufacture a refractory consisting of barium oxide and silica in total proportion of 5-35%, and the balance substantially all magnesium oxide. Nos. 2,160,923-4. John D. Sullivan, to Battelle Memorial Institute, both of Columbus, Ohio.

Method refining magnesium metal, wherein powdered magnesium is heated above the melting point in a suitable apparatus, constant agitation being maintained, temperature and pressure being so controlled that magnesium vapors are produced, removed, and sublimed. Method is carried out in hydrogen atmosphere at reduced pressures. No. 2,160,969. Fritz Hansgirg, Radenthein, Austria, to American Magnesium Metals Corp., Pittsburgh, Pa.

Copper brazing alloy, containing 4-10% phosphorous and 0.1-0.6% antimony. No. 2,161,057. Philip R. Kalischer, Wilkinsburg, Pa., to Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.

Silver electric-contact alloy, containing 0.05-20.00% magnesium. No. 2,161,253. Franz R. Hensel and Kenneth L. Emmert, to P. R. Mallory & Co., Inc., both of Indianapolis, Ind.

Silver electric-contact alloy, containing 2.0-3.8% magnesium. No. 2,161,254. Franz R. Hensel and Kenneth L. Emmert, to P. R. Mallory & Co., Inc., all of Indianapolis, Ind.

Method and apparatus for concentrating dry ores. No. 2,161,425. Charles T. Morrison and Harry T. Eastman.

Copper electrode alloy, containing 0.1-10% zinc and 0.1-5.0% zirconium. No. 2,161,467. Franz R. Hensel and Earl I. Larsen, to P. R. Mallory & Co., Inc., all of Indianapolis, Ind.

Copper alloy, containing 0.002-0.100% lithium, and 0.1-5.0% zirconium. No. 2,161,468. Franz R. Hensel and Earl I. Larsen, to P. R. Mallory & Co., Inc., all of Indianapolis, Ind.

Silver alloy, containing 0.05-15.00% magnesium and 0.05-25.00% gold. No. 2,161,574. Franz R. Hensel, Kenneth L. Emmert, and James W. Wiggs, to P. R. Mallory & Co., Inc., all of Indianapolis, Ind.

Silver alloy, containing magnesium (0.1-15.00%) and cadmium (0.5-25.00%). No. 2,161,575. Franz R. Hensel, Kenneth L. Emmert and James W. Wiggs, to P. R. Mallory & Co., Inc., all of Indianapolis, Ind.

Silver alloy, containing from 0.05 to 15.00% magnesium and from 0.005 to 10.00% thorium. No. 2,161,576. Franz R. Hensel, Kenneth L. Emmert, and James W. Wiggs, to P. R. Mallory & Co., Inc., all of Indianapolis, Ind.

Method of bonding powdered metallic material to steel, comprising covering clean steel surface with less than 0.0001 inch of copper, and compressing at elevated temperature the powdered metal into the coppered steel surface to form thereby a direct bonding. No. 2,161,597. Carl E. Swartz, Cleveland Heights, Ohio, to The Cleveland Graphite Bronze Co., Cleveland, Ohio.

Paper and Pulp

Method processing Georgia clay to a finely-divided state suitable for coating paper. No. 2,158,987. William T. Maloney, Natural Bridge, N. Y., to Georgia Kaolin Co., a corp. of Georgia.

Process manufacturing cellulose esters from wood fiber, and incorporating same into sheets. No. 2,159,643. Richard Weingand and Ernst Acker, Bomlitz, near Walsrode, Germany, to Sylvania Industrial Corp., Fredericksburg, Va.

Waterleaf nitration paper comprising unbeaten, bleached sulfite hardwood pulp (alpha-cellulose not over 90%) treated with a nitrating acid. No. 2,159,675. George A. Richter, to Brown Company, Berlin, N. H.

Method producing viscose pulp of high fiber content. No. 2,159,676. George A. Richter and Harold P. Vannah, to Brown Company, all of Berlin, N. H.

Method for recovery from waste materials containing paper and aluminum foil, of pulp and aluminum metal; process comprises treatment of waste, without substantial decomposition, with acetic acid solution and mercuric chloride, the latter taking up the aluminum. No. 2,160,500. Ludwig Halberstadt, Halle, Germany.

Production stiff, board-like products from vegetable fibers. No. 2,161,653. George H. Ellis, New Brighton, Minn., to The Insulite Co., Minneapolis, Minn.

Production water-resisting, insect-and fungi-toxic, felted fiber products from vegetable fibers, comprising treatment of the fibers with a water-soluble chlorinated phenol mixed with rosin size, in aqueous suspension, adding zinc chloride to precipitate the phenol, then adding alum. No. 2,161,654. George H. Ellis, New Brighton, Minn., to The Insulite Co., Minneapolis, Minn.

Manufacture from wood fibers of grainless, high-strength board-like sheeting. No. 2,161,655. George H. Ellis, New Brighton, Minn., to The Insulite Co., Minneapolis, Minn.

Manufacture of bleached pulp from flax or hemp tow. No. 2,161,763. Edwin P. Jones, Garden City, N. Y., to Champagne Paper Corp., New York City.

Petroleum

Manufacture gasoline, consisting in distilling hydrocarbon oil distillate of boiling-point range 650-850 deg. F. under 60-100 p.s.i. pressure, and separating from the product obtained a distillate whose initial boiling-point approximates the maximum boiling-point of gasoline; latter fraction is redistilled at over 300 p.s.i. No. 21,095. Robert E. Humphreys, to Standard Oil Co., both of Whiting, Ind.

Motor fuel, comprising a high-boiling petroleum hydrocarbon distillate of the gas oil type, having dissolved therein less than 10% by vol. of a pentyl nitrate of the group including n-butyl carbinitrate sec-butyl carbinitrate, methylpropyl and diethyl carbinitrates. No. 2,158,050. Euphime V. Bereslavsky, New York City.

Petroleum cracking catalyst for polymerizations, comprising the following, in parts by weight: natural phosphate rock (20-100), carnotite ore (20-100), zinc phosphate (5-20), and barium halide (3-12). No. 2,158,154. James R. Rose, Edgeworth, Pa.

Manufacture motor gasoline from cracked petroleum distillates. No. 2,158,353. Carl C. Chaffee, to Continental Oil Co., both of Ponca City, Okla.

Method dewaxing wax-bearing oil, by first separating wax with an appropriate solvent, then separating wax-bearing extract and treating same with dissolved aluminum stearate. No. 2,258,358. Louis P. Evans, Beacon, N. Y., to The Texas Company, New York City.

Manufacture lubricating oil of high viscosity, from wax-bearing mineral oil, comprising mixing with the oil a solvent mixture of liquid sulfur dioxide and monochlorobenzol and chilling to 0 deg. F. or below. No. 2,158,360. Francis X. Govers, Vincennes, Ind., to Indian Refining Co., Lawrenceville, Ill.

Manufacture lubricating oils. No. 2,158,361. Francis X. Govers, Vincennes, Ind., to Indian Refining Co., Lawrenceville, Ill.

Dewaxing process for petroleum distillates. No. 2,158,370. Edwin C. Knowles, Beacon, N. Y., to The Texas Company, New York City.

Preparation mineral oil emulsions. No. 2,158,374. David R. Merill, Long Beach Calif., to Union Oil Co., of California, Los Angeles, Calif.

Process for cracking of hydrocarbon oils. No. 2,158,504. Will K. Holmes, Tulsa, Okla., to Texas Company, New York City.

Production motor fuel from heavy hydrocarbon oil. No. 2,158,559. Harold V. Atwell, White Plains, and Malvin R. Mandelbaum, New York City, to Process Management Co., Inc., New York City.

Conversion normally gaseous hydrocarbons to liquid aromatic hydrocarbons. No. 2,158,582. Robert M. Isham, Okmulgee, and Max R. Ryan, Tulsa, Okla., to Danciger Oil & Refineries, Inc., Tulsa, Okla.

A viscous lubricating oil stabilized with a small proportion of soluble organic oxidation inhibitor having a boiling-point above 200 deg. C. at atmospheric pressure; inhibitor is a metallo-organic compound. No. 2,158,668. Raphael Rosen, Elizabeth, N. J., to Standard Oil Development Co., a corp. of Del.

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Improved method for dewaxing petroleum hydrocarbon oil. Nos. 2,158,671-2. Donald E. Carr, Long Beach, and Maner L. Wade, Naples, Calif., to Union Oil Co. of California, Los Angeles, Calif.

Method and apparatus for continuous extraction of hydrocarbon oils with liquid reagents. No. 2,158,690. Sumner E. Campbell, Long Beach, Calif.

Cracking of hydrocarbon oils. No. 2,158,812. Joseph G. Alther, to Universal Oil Products Co., both of Chicago, Ill.

Pyrolytic conversion of hydrocarbon oils. No. 2,158,840. Kenneth Swartwood, to Universal Oil Products Co., both of Chicago, Ill.

Method converting mineral hydrocarbons. No. 2,158,962. Carbon P. Dubbs, Wilmette, Ill., to Universal Oil Products Co., Chicago, Ill.

Method producing hydrocarbon oil by polymeric condensation of gas containing over 30% olefines of the amylenic and butylenic type, in the presence of a Friedel-Crafts catalyst. No. 2,159,148. Hans Haeuber and Josef Hirschbeck, Ludwigshafen-on-the-Rhine, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Method separating gasoline-type hydrocarbons of different octane values by treatment of their admixtures with acetonitrile, and separating the layers so formed. No. 2,159,175. Martin Mueller-Cunradi and Robert Uloth, Ludwigshafen-on-the-Rhine, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Production lubricating oils adapted to the lubrication of automatic, variable-speed power transmissions. No. 2,159,220. George M. McNulty, Cranford, N. J., and Elmer W. Adams, Hammond, Ind., to Standard Oil Co., Chicago, Ill.

Process for breaking oil-in-water type crude petroleum emulsions. Nos. 2,159,312-3. Charles M. Blair, Jr., to The Tret-O-Lite Company, both of Webster Groves, Mo.

Process for treating Pennsylvania-grade residuum oil, by solvent extraction by methyl ethyl ketone. No. 2,159,444. Wilbert B. McCluer and Merrell R. Fenske, State College, Pa., to Pennsylvania Petroleum Research Corp., a corp. of Pennsylvania.

Process for cracking heavy hydrocarbon oils for the production of coke and gasoline hydrocarbons. No. 2,159,502. Hugh M. Corrough, Tulsa, Okla., to Power Patents Co., Hillside, N. J.

Method and apparatus for electrically treating emulsions. No. 2,159,682. Halley Wolfe, Long Beach, Calif., to Petroleum Rectifying Co. of California, Los Angeles, Calif.

Thermal conversion of petroleum hydrocarbons. No. 2,158,811. Joseph G. Alther, to Universal Oil Products Co., both of Chicago, Ill.

Method for polymerizing hydrocarbon gases. No. 2,159,746. Percy A. Maschwitz, to The Pure Oil Co., both of Chicago, Ill.

Method reducing odor in mercaptan-bearing hydrocarbons, comprising the addition of glucose and a little mineral acid. No. 2,160,116. Harold E. Bode, Chicago, Ill., to Corn Products Refining Co., New York City.

Production hydrocarbons of high solvent power from petroleum fractions boiling from 150 to 600 deg. C. No. 2,160,136. Per K. Frolich, Westfield, N. J., to Standard-I. G. Company, of Delaware.

Production hydrocarbon-oil-soluble higher primary aliphatic hydroxylamines in which the hydroxy and amino groups have added to the olefinic linkages in compounds of a distillate boiling at 200-700 deg. C. No. 2,160,138. Peter J. Gaylor, Staten Island, N. Y., to Standard Oil Development Co., of Delaware.

Method fractionating the lower hydrocarbon volatiles from petroleum refinery gases. No. 2,160,163. Henry Janney Nichols, Jr., Scotch Plains, and George L. Mateer, Roselle, N. J., to Standard Oil Development Co. of Delaware.

Method dehydrogenating hydrocarbons by a vapor-phase catalysis. No. 2,160,170. Friedrich Martin, Oberhausen, Heinrich Tramm, Oberhausen-Holten, and Reinhard Jung, Oberhausen-Sterkrade, Germany, to Ruhrchemie Aktiengesellschaft, Oberhausen-Holten, Germany.

Apparatus for heat-treatment of hydrocarbons. No. 2,160,239. Vanderveer Voorhees, Hammond, Ind., to Standard Oil Co. (Indiana), Chicago, Ill.

Method increasing anti-knock values of hydrocarbons boiling in the gasoline range, by catalytic contact with a body of gypsum. No. 2,160,249. Harry E. Drennan, Whittenburg, Tex., to Phillips Petroleum Co., a corp. of Delaware.

Process for distilling petroleum hydrocarbon oils. No. 2,160,256. Blair G. Aldridge and Edward G. Ragatz, to Union Oil Co. of California, all of Los Angeles, California.

Lubricant containing a small amount of alkyl titanate. No. 2,160,273. Clarence M. Loane and Bernard H. Shoemaker, Hammond, Ind., to Standard Oil Co., Chicago, Ill.

Process and apparatus for converting petroleum hydrocarbons into gasoline. Nos. 2,160,286-7-8. Robert F. Ruthruff, Hammond, Ind., to Standard Oil Co., Chicago, Ill.

Process converting heavy hydrocarbons into lighter oils. No. 2,160,580. Sijbren Tijmstra, Berkeley, Calif., to Shell Development Co., San Francisco, Calif.

Method extracting hydrocarbon oils with a solvent comprising a carbon-substituted derivative of a cyclic thio-compound having a substituent bearing a carbonyl group. No. 2,160,607. Willem J. D. van Dijck, The Hague, Netherlands, to Shell Development Co., San Francisco, Calif.

Process removing acid material from hydrocarbon solution, comprising essentially extraction with aqueous ethylene glycol containing alkali metal hydroxide. No. 2,160,632. David Louis Yabroff, Berkeley, and Ellis R. White, Albany, Calif., to Shell Development Co., San Francisco, Calif.

Cracking process for hydrocarbon oils. No. 2,160,774. Harold V. Atwell, White Plains, N. Y., to Gasoline Products Co., Inc., Newark, N. J.

Process converting heavy hydrocarbon oils into motor fuel. No. 2,160,814. Maurice H. Arveson, to Standard Oil Co., both of Chicago, Ill.

Process for cracking of hydrocarbon oils. No. 2,160,872. Lebbeus C. Kemp, Port Arthur, Tex., to The Texas Company, New York City.

Process for cracking of hydrocarbon oils. No. 2,160,875. Wayne E. Kuhn, Port Arthur, Tex., to The Texas Company, New York City.

Method reducing viscosity and gelation of drilling muds, comprising an aqueous slurry treatment, said slurry having dissolved therein an alkali vanadate. No. 2,160,949. Milton Williams, Houston, Tex., to Standard Oil Development Co., of Delaware.

Method dewaxing mineral oil, wherein the oil is diluted with a normal aliphatic ketone having 5-6 carbon atoms, one radical having at least 3 carbon atoms; mixture is chilled to precipitate the wax, and oil recovered from the filtrate. No. 2,160,985. Oldrich S. Pokorny, Sarnia, Ontario, Canada, to Standard Oil Development Co., of Delaware.

Method increasing production of wells, where the geological formation is of siliceous and calcareous nature and has been acid-treated, comprising the introduction into the formation of alkali-metal hydroxide to further dissolve residues left by the acid treatment. No. 2,161,085. William Clifton Phalen, Syracuse, N. Y., to The Solvay Process Co., New York City.

Method and apparatus for burning waste paper pulp liquors containing combustible organic matter and inorganic chemicals, to recover the inorganic materials and heat values of organic waste. No. 2,161,110. George H. Tomlinson, Westmount, Quebec, Canada, and Leslie S. Wicoxson, Ridgewood, N. J.; said Leslie S. Wilcoxson to The Babcock & Wilcox Company, Newark, N. J.

Process rolling steel sheet having chromatized surfaces. No. 2,161,116. Francis Guy White, University City, Mo., to Granite City Steel Co., Granite City, Ill.

Method and apparatus recovering waste paint, etc., from spray-coating operations. No. 2,161,122. Lural J. Anderson, South Bend, Ind., to Dearborn Chemical Co., Chicago, Ill.

Method removing pigmentary stains from laundry wash, essentially entailing the use of a series of break compounds comprising soap, soda, and a phosphate. No. 2,161,167. Max Hushinsky, Brooklyn, N. Y.

Drilling fluid containing molten sulfur and an admixture of a small amount of olefine polysulfide, such that viscosity of the sulfur is greatly reduced at a temperature above 320 deg. F. No. 2,161,245. Gordon A. Cain and John B. Chatelain, Freeport, Tex., to Freeport Sulphur Co., Freeport, Texas.

Manufacture high anti-knock gasoline. No. 2,161,247. Richard J. Dearborn, Summit, N. J., to The Texas Company, New York City.

Oxidation inhibitor for preventing deterioration of petroleum oils, comprising a "green"-sulfonic-acids solution saponified with alkali, which is dehydrated and then fused with alkali; reaction mixture, after neutralization, is worked to recover a purified, water-insoluble product. No. 2,161,317. Alexander N. Sachanen and Pharez G. Waldo, Woodbury, N. J., to Socony-Vacuum Oil Co., Inc., New York City.

Polymerization of normally-gaseous olefines. No. 2,161,392. Donald R. Stevens, Swissvale, and William A. Gruse, Wilkinsburg, Pa., to Gulf Research & Development Co., Pittsburgh, Pa.

Rubber articles capable of resisting swelling when in contact with hydrocarbons, including a rubber composition of latex and dextrin, and additional rubber mixed therewith and vulcanized. No. 2,161,445. John M. Ball, Pelham, N. Y., to R. T. Vanderbilt Co., Inc., New York City.

Lubricant composition, comprising a mineral lubricating oil and a small amount of polychlorinated naphthol. No. 2,161,560. Moses L. Crossley, Plainfield, N. J., to Calco Chemical Co., Inc., Bound Brook, N. J.

Mineral oil composition, comprising highly refined lubricant oil containing not over 0.5% alkyl ester of an alkyl xanthic acid. No. 2,161,566. Everett W. Fuller, Woodbury, N. J., to Socony-Vacuum Oil Co., Inc., New York City.

Continuous extraction process for solvent refining of hydrocarbon oil. No. 2,161,567. William P. Gee, Plainfield, N. J., and Max Neuhaus, Fishkill, N. Y., to The Texas Co., New York City.

Process for the dewaxing of wax-bearing hydrocarbon oil to produce oil of about zero degrees pour. No. 2,161,569. Howard H. Gross, Beacon, N. Y., to The Texas Company, New York City.

Process for solvent refining and dewaxing of residual wax-bearing mineral oil. No. 2,161,572. Waldersee B. Hendrey, Beacon, N. Y., to The Texas Company, New York City.

Method neutralizing acid-treated hydrocarbon oil distillates, comprising quickly suspending finely-divided quicklime in 200-400 parts water and then contacting acid oil with the lime suspension, and separating the neutralized oil. No. 2,161,580. Marcus T. Kendall, Long Beach, Calif., to The Texas Company, New York City.

Method dewaxing mineral oil, comprising the addition to the oil prior to dewaxing about 0.1-0.5% cellulose stearate and about 0.02-0.20% montan wax; oil is then chilled and the precipitated wax separated. No. 2,161,581. Edwin C. Knowles, Beacon, N. Y., to The Texas Company, New York City.

Lubricant containing a compound of an alpha-amino aliphatic acid alkylester. No. 2,161,615. Melvin A. Dietrich, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Method for extraction refining of liquid hydrocarbon mixtures containing paraffinic and non-paraffinic components with a solvent comprising an acetylenic alcohol. No. 2,161,625. Harold S. Holt, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Catalytic conversion of hydrocarbon oils into high-quality gasoline. Nos. 2,161,676-7. Eugene J. Houdry, Haverford, Pa., to Houdry Process Corp., Wilmington, Del.

Lubricating oil containing a small amount of a polyaryl-alkyl chloride. No. 2,161,678. Kenneth H. Klipstein, Short Hills, N. J., to Calco Chemical Co., Inc., Bound Brook, N. J.

Solvent refining process for hydrocarbon oils, solvent being symmetric dibromohydrine. No. 2,161,753. Ernst Terres, Berlin, Germany, and Josef Moos, New York, and Erich Saegebarth, Jackson Heights, N. Y., to Edeleanu Gesellschaft, m.b.H., of Germany.

Pigments

Zinc sulfide pigment, incorporating sufficient of an alkaline guanidine to prevent livering. No. 2,159,055. Clifford K. Sloan and Gordon D. Patterson, to E. I. du Pont de Nemours & Co., all of Wilmington, Del.

Preparation aqueous pigment pastes, consisting of pigment, a quaternary alkyl ammonium salt as dispersant, and water. No. 2,160,119. Karl Brodersen, Dessau in Anhalt, Germany, to General Aniline Works, Inc., New York City.

Production a photomechanical printing surface. No. 2,160,242. Kevin William Caton Webb, Coonoor, Nilgirls, South India, one-half to Robert Laing Bruce Gall, Ootacamund, Nilgirls, South India.

Ribbon ink, consisting of finely-divided pigment suspended in tricresyl phosphate, and a basic color dissolved in diglycol laurate. No. 2,160,511. Samuel A. Neidich, Burlington, N. J.

Method changing color ink containing ammonium salts of iron, manganese, or nickel sulfate, comprising the application thereto an aqueous solution of alkali metal carbonate or silicate. No. 2,161,205. William H. Shields, to The Palm Bros., both of Cincinnati, Ohio.

Manufacture finely-divided barium sulfate suitable for pigments. No. 2,161,650. Lincoln T. Work and Hugh Alesandroni.

Manufacture finely-divided barium sulfate. No. 2,161,651. Elliott J. Roberts, Westport, Conn., and Ralph W. Shafor, New York City.

Continuous process for preparation of precipitated, finely-divided barium sulfate. No. 2,161,652. Elliott J. Roberts, Westport, Conn.

Manufacture titanium dioxide pigments containing small amounts of an antimony-oxygen compound calcined therewith. No. 2,161,755. Robert William Ancrum, Stockton-on-Tees, and Assur Gjessing Oppegaard, Billingham, Eng., to Titan Co., Inc., Wilmington, Del.

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Resins, Plastics, Etc.

Manufacture polyamides from reaction products derived from the interaction of dicarboxylic acids and their amide-forming monomeric derivatives with primary or secondary diamines having an oxygen atom in the nucleus. No. 2,158,064. Wallace Hume Carothers, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Mixed ester composition of glycerol esters of monocarboxylic acids comprising methacrylic acid and soya bean oil acids. No. 2,160,532. Harold J. Barrett, Niagara Falls, N. Y., and Daniel E. Strain, Wilmington, Del., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Manufacture a polymer of monomeric vinylidene chloride, polymer being substantially insoluble in chloroform, carbon bisulfide, ethylene bromide, or benzene, sparingly soluble in tetrachlorethane, and resistant to acids and alkalis at room temperature. Nos. 2,160,903-4. John H. Reilly and Ralph M. Wiley, to The Dow Chemical Co., all of Midland, Mich.

Manufacture plastic material by reaction of 1,1-dichloroethylene or 1-chloro-1-bromoethylene with a vinyl ester, and polymerization of the two reactants. No. 2,160,931. Ralph M. Wiley, to The Dow Chemical Co., both of Midland, Mich.

Preparation co-polymers from vinylidene chloride with a styrene compound, producing bodies containing 2-60% of the styrene compound copolymerized with the vinylidene chloride. No. 2,160,932. Ralph M. Wiley, to The Dow Chemical Co., both of Midland, Mich.

Catalyst mixture for vinylidene halide polymerizations, comprising tetraethyl lead, an oxygenating agent, a poly-halo oxygen-containing organic compound from the group consisting of halogenated organic compounds. No. 2,160,933. Ralph M. Wiley, to The Dow Chemical Co., both of Midland, Mich.

Catalyst polymerizing vinylidene halides, consisting of an organic peroxide and a metal carbonyl. Nos. 2,160,934-5. Ralph M. Wiley, to The Dow Chemical Co., both of Midland, Mich.

Method polymerizing monomeric vinylidene chloride to a granular, moldable plastic powder, comprising polymerization of the chloride in a relatively small amount of inert solvent miscible with said chloride which is the only polymerizable material present. No. 2,160,936. John H. Reilly and Charles R. Russell, to The Dow Chemical Co., all of Midland, Mich.

Co-polymers of vinylidene chloride with one of the group comprising an unsaturated ester of an inorganic acid of the group consisting of hydrochloric, phosphoric, ortho-silicic, and boric acids. No. 2,160,942. Edgar C. Britton, Clyde W. Davis, and Fred Lowell Taylor, to The Dow Chemical Co., all of Midland, Mich.

Co-polymers of vinylidene chloride with unsaturated aliphatic ethers of the type R-O-R′; R is a member of the class consisting of vinyl, allyl, 2-methyl-allyl, and allyloxy-methyl radicals; R′ is one of a group comprising R, lower alkyl radicals, 2-chloroethyl, 2-hydroxy-ethyl, and epoxy-propenyl radicals. No. 2,160,943. Edgar C. Britton, Clyde W. Davis, and Fred Lowell Taylor, to The Dow Chemical Co., all of Midland, Mich.

Monomeric vinylidene chloride stabilized with an organic amino compound from the group consisting of lower aliphatic amino-and phenyl-series aromatic amino compounds, the latter being a polymerization inhibitor. No. 2,160,944. Gerald H. Coleman and John W. Zemba to The Dow Chemical Co., all of Midland, Mich.

Co-polymers of vinylidene chloride with an unsaturated ester of the type: $CH_2 = C(R)\text{-}CH_2\text{—}COOCHX_2$ wherein R is hydrogen, halogen, or methyl, one X is halogen and the other hydrogen or the same halogen. No. 2,160,946. Edgar C. Britton and Fred Lowell Taylor, to The Dow Chemical Co., all of Midland, Mich.

Co-polymers of vinylidine chloride with a mono-halo-propene. No. 2,160,947. Robert C. Reinhardt, to The Dow Chemical Co., both of Midland, Mich.

Plastic composition, comprising a polymeric vinylidene chloride plasticized with one of the group consisting of alkyl- and aryl-oxy substitution products of propylene oxide and its homologs. No. 2,160,948. Ralph M. Wiley, Francis N. Alquist, and Harold R. Slagh, to The Dow Chemical Co., all of Midland, Mich.

Vinyl resin stabilizer, antimony oxide, having inhibiting action against light-deterioration of vinyl halide polymers. No. 2,161,026. Arthur K. Doolittle, South Charleston, W. Va., to Carbide & Carbon Chemicals Corp. of New York.

Dimerization of trichloroethylene, by heating under pressure to above 150 deg. C., in the absence of a catalyst. No. 2,161,078. Martin Mugdan and Josef Wimmer, Munich, Germany, to Consortium fur Elektrochemische Industrie, G.m.b.H., Munich, Bavaria, Germany.

Plastic composition prepared by treatment of rubber with chlorostannic acid and an alkyl naphthalene; said alkyl group to have at least 4 carbon atoms. No. 2,161,201. Joseph J. Schaefer, Germantown, Pa., to The Sharples Solvents Corp., Philadelphia, Pa.

Process dispersing polymerizable organic liquid in a non-solvent liquid vehicle, continuously flowing said dispersion through a heated tube for such time as is required to effect polymerization, and maintaining the emulsion in a state of turbulent flow during the heating period. No. 2,161,481. Barnard M. Marks, Clifton, N. J., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Production synthetic resins from natural and refinery gases. No. 2,161,599. Charles C. Towne, Beacon, N. Y., to The Texas Company, New York City.

Preparation polymerized di-(2-chlorally) ether. No. 2,161,737. Gerald H. Coleman and Robert W. Sapp, to The Dow Chemical Co., all of Midland, Mich.

Rubber

Manufacture finely-divided rubber hydro-halides. No. 2,158,760. Earle H. Morse, Nutley, N. J., and William S. Johnston, New York and Edward L. Mack, Douglaston, N. Y., to Reynolds Research Corp., New York City.

Antioxidant for rubber, comprising a derivative of 1,2-dihydroquinoline. No. 2,160,200. Raymond F. Dunbrook and Bingham J. Humphrey, to The Firestone Tire & Rubber Co., all of Akron, Ohio.

Manufacture synthetic rubber-like products by interpolymerization in aqueous emulsion of a mixture of butadiene with a methacrylic ester. No. 2,161,038. Bernard James Habgood, Rowland Hill, and Leslie Budworth Morgan, Blackley, Manchester, England, to Imperial Chemical Industries, Ltd., of Great Britain.

Manufacture synthetic rubber-like products by interpolymerization in aqueous emulsion of butadiene with a chloroalkyl ester of methacrylic acid, said alkyl group having not more than 3 carbon atoms. No. 2,161,039. Bernard James Habgood, Rowland Hill, and Leslie Budworth Morgan, Blackley, England, to Imperial Chemical Industries, Ltd., of Great Britain.

Textiles

Method producing desirable hand in rayon fabrics derived from organic derivatives of cellulosic materials, comprising 1-15 min. treatment with a 2-5% aqueous solution of swelling agent selected from the group, methyl alcohol, ethyl alcohol, and acetone; bath is maintained at 50-75 deg. C. No. 2,158,110. Camille Dreyfus, N. Y. City, and Hebrert Platt, Cumberland, Md., to Celanese Corp. of America, a corp. of Delaware.

Thermoplastic lamina of fabric to be interposed between two other layers of fabric, comprising a weave so designed that the non-thermoplastic yarns are covered on both sides with a thin layer of thermoplastic threads. No. 2,158,112. Donald Finlayson and Harry Crawshaw, Spondon, near Derby, England, to Celanese Corp. of America, a corp. of Delaware.

Mercerizing process for rayon materials. No. 2,158,494. Harry Corteen, Robinson Percy Foulds, and Frederick Charles Wood, Manchester, Eng., to Tootal Broadhurst Lee Co., Ltd., Manchester, Eng.

Method reducing luster on rayon textiles. No. 2,159,013. Henry Dreyfus, London, England.

Method acetylating acetone-soluble cellulose acetate fibers, comprising treatment of the material with acetic anhydride dissolved in an appropriate solvent, in the presence of perchloric acid as a catalyst, until fibers are converted to a condition of reduced solubility in acetone. No. 2,159,014. Henry Dreyfus, London, England.

Process improving qualities of regenerated viscose-type cellulose textiles, comprising esterification with an organic acid anhydride containing not more than 6 carbon atoms, in the presence of a small amount of acetyl chloride and a halide from the group comprising iron, tin, and zinc. No. 2,159,015. Henry Dreyfus, London, England.

Process improving properties of rayon materials soluble in organic solvents, wherein cellulose base is esterified with a non-solvent liquid having a shrinking action on the material and containing a small amount of esterifying agent therefor, and a large amount of organic liquid having a high swelling action on the material but chemically inert to it. No. 2,159,016. Henry Dreyfus, London, England.

Process improving properties of cellulose acetate yarn, consisting of treating fabric with an aqueous emulsion of cyclohexanol stearate. No. 2,159,113. William Whitehead, Cumberland, Md., to Celanese Corp. of America, a corp. of Delaware.

Method producing wash-fast, sized fabrics resistant to shrinkage. No. 2,159,875. Kaspar Zwicky and Friedrich Brunner, to Aktiengesellschaft Cilander, all of Herisau, Switzerland.

Water-repellent composition for treating textiles, comprising a compound of the type $RCONH\text{-}CH_2\text{-}N(tert)\text{-}X$, where R is an alkyl of at least 7 carbon atoms, and X the acidic radical of an organic acid of $K_{dis.}$ less than 0.01. No. 2,160,176. Joseph Harrel Shipp, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Flexible electric insulation, comprising a vulcanized mix of rubber, sulfur, and an elastic isobutylene polymer of high M. W. No. 2,160,204. Willis A. Gibbons, Montclair, N. J., to United States Rubber Co., New York City.

Manufacture fluid rubber antioxidants from aliphatic ketone-diarylamines. No. 2,160,223. Ludwig Meuser, Naugatuck, and Charles S. Dewey, Cheshire, Conn., to United States Rubber Co., New York City.

Process for waterproofing textiles with baths containing various unsaturated aliphatic compounds. No. 2,160,375. Arthur Voss, Frankfort-on-the-Main-Hochst and Hermann Staerk, Bad Soden in Taunus, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, German.

Bleaching process solutions, comprising clear solutions of hydrogen peroxide containing small amounts of dissolved magnesium silicate, and having a pH range of 9-14. No. 2,160,391. Joseph S. Reichert, Wilbie S. Hinegardner, and Howard L. Potter, Niagara Falls, N. Y., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Method processing rayon filaments with formamide, rendering same more pliant and flexible. No. 2,160,458. Ernest K. Gladding, Buffalo, N. Y., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Method applying cotton dyestuff to rayon materials treated with silica gel prior to the spinning operation, in the solidifying medium. No. 2,160,839. Camille Dreyfus, New York City, and William Whitehead, Cumberland, Md., to Celanese Corp. of America, of Delaware.

Hard rubber article having a strongly adherent and resistant rubber-free surface coating composed of co-polymeric resin, prepared from vinyl chloride and vinyl acetate. Resin is bonded to the hard rubber surface by baking, and contains a metallic heat-stabilizing compound. No. 2,161,024. Arthur K. Doolittle, South Charleston, W. Va., to Carbide & Carbon Chemicals Corp., of New York.

Method improving a cellulose material undergoing an oxidizing bleach, consisting of irradiation of the material with light of wavelength substantially longer than 300 mu. No. 2,161,045. Wilhelm Hirschkind, Berkely, David J. Pye, Pittsburg, Calif., and Earl G. Thompson, Seattle, Wash., to The Dow Chemical Co., Midland, Mich.

Manufacture artificial wool, by modification, artificially, of vegetable fibers, and then treating with a dilute gelatine solution. No. 2,161,377. Michael P. Mulqueen, Walden, N. Y., to The Hatters Fur Exchange, Inc., Walden, N. Y.

Synthetic textile fiber prepared from a resinous base, latter being a conjoint polymer of vinyl halide with vinylester of an aliphatic acid; said polymer having an average M. W. of at least 15,000. No. 2,161,766. Edward W. Rugeley, Theophilus A. Field, Jr., and John F. Conlon, Charleston, W. Va., to Carbide & Carbon Chemicals Corp., of New York.

Water, Sewage Treatment

Method treating neutral sewage (of pH 7), by electrodialysis in the cathode compartment of an electrolytic cell, thereby raising the pH from 0.7 to 1.6 pH—sufficient to permit addition of soluble iron and aluminum salts for the sedimentation treatment. No. 2,158,595. Edgar A. Slagle, North Plainfield, N. J., to Research Corporation, New York City.

Apparatus for decantation and settling of solids from aqueous suspensions of matter. No. 2,160,838. John van Nostrand Dorr, Westport, Conn., to The Dorr Company, Inc., New York City.

Method and apparatus for purifying water, comprising filtering and precipitating units. No. 2,161,721. Robert Lee Negus, Nova Scotia, Canada, to Aqua-Electric Corporation, Ltd., Halifax, Nova Scotia, Canada.

Dispersing Agent Extraordinary—TSPP

Among the several valuable properties of Tetra Sodium Pyrophosphate is its ability as a water softener to inhibit calcium and magnesium. By instantly suppressing these insolubles and keeping them in suspension in the solution, TSPP proves itself a dispersing agent extraordinary!

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As pioneers in the production of phosphates in America we have a solid background of technical and production experience with TSPP. Our production facilities are of sufficient capacity to insure meeting your needs—present and future.

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